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HOPKINS AND UNDERWOOD'S
ARITHMETIC
BOOK ONE
REVISED



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HOPKINS AND UNDERWOOD'S

A R I T H M E T I C

BOOK ONE

REVISED

BY

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PREFACE

BOOK ONE is intended for the second, third, and fourth years of school. Part I contains a sufficient number of varied exercises for the second year. Its purpose is to make definite the somewhat vague concepts originating in the oral lessons of the first year and in the children's common experiences with numbers. Part II deals with the four fundamental principles, as applied to integers and to United States Money. Part III treats of Fractions, Decimals, Compound Quantities, and Percentage.

The subject of Decimals is introduced early, as it should be, affording a review of the fundamental operations, and at the same time giving an insight into practical computation.

In writing this book the authors have not forgotten that for beginners in arithmetic the most essential thing is practice in the art of numbers.

A characteristic feature of the book is that, with very few exceptions, each of the problems involves but one of the fundamental processes. The explanations of processes are brief and are generally illustrated by cuts, which furnish the children with a visual basis of comprehension.

THE AUTHORS.

GALVESTON, TEXAS,
January, 1912.

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ARITHMETIC

BOOK ONE

PART I

One	Two	Three	Four	Five	Six	Seven	Eight	Nine
1	2	3	4	5	6	7	8	9

Naught, zero, or cipher is written 0. Ten is written 10. Eleven is written 11. Twelve is written 12.

EXERCISE 1 (Oral)

How many are :

1. 1 ball and 3 balls ? 1 ball and 4 balls ?
2. 2 balls and 7 balls ? 2 balls and 8 balls ?
3. 3 balls and 4 balls ? 3 balls and 5 balls ?
4. 4 balls and 3 balls ? 4 balls and 4 balls ?
5. 5 balls and 2 balls ? 5 balls and 3 balls ?
6. 2 balls and 3 balls ? 2 balls and 4 balls ?
7. 2 balls and 5 balls ? 2 balls and 6 balls ?
8. 2 balls and 7 balls ? 2 balls and 8 balls ?
9. 3 balls and 2 balls ? 3 balls and 3 balls ?
10. 3 balls and 4 balls ? 3 balls and 5 balls ?

NOTE TO TEACHER. Objects should be used in developing these combinations. An abacus is a useful instrument for this purpose.

EXERCISE 2 (Oral)

NOTE. In the following exercises, objects should be used to develop the sums.

How many marbles are :

1. 5 marbles and 4 marbles? 5 marbles and 5 marbles?

2. 6 marbles and 1 marble? 6 marbles and 2 marbles?

3. 6 marbles and 3 marbles? 6 marbles and 4 marbles?

4. 7 marbles and 1 marble? 7 marbles and 2 marbles?

5. 7 marbles and 3 marbles? 8 marbles and 1 marble?

6. 8 marbles and 2 marbles? 2 marbles and 8 marbles?

7. 9 marbles and 1 marble? 1 marble and 9 marbles?

8. How many marbles are four marbles and four marbles?

9. How many marbles are four marbles and seven marbles?

10. How many marbles are seven marbles and four marbles?

11. How many marbles are five marbles and six marbles?

12. How many marbles are six marbles and five marbles?

EXERCISE 3 (Oral)

1. How many are two oranges and three oranges?
2. How many are three oranges and two oranges?
3. How many are two oranges and four oranges?
4. How many are four oranges and two oranges?
5. How many are three oranges and three oranges?
6. How many are four oranges and two oranges?
7. How many are five oranges and one orange?
8. How many are three pears and three pears?
9. How many are three pears and two pears?
10. How many are three pears and one pear?
11. How many are four pears and two pears?
12. How many are five pears and one pear?
13. Edward had six marbles and lost one. How many had he left?
14. Edward had six marbles and lost two. How many had he left?
15. James had six marbles and gave Edward three. How many did he keep?
16. Henry had four marbles and gave James one. How many did Henry then have?
17. Henry had four marbles and lost two. How many did he then have?
18. Mary bought three apples; she gave two of them to Alice. How many did she keep?
19. Henry bought five oranges. After giving Edward three, how many had he left?

EXERCISE 4 (Oral)

1. Six and three are how many?
2. Six and four are how many?
3. Seven and two are how many?
4. Seven and three are how many?
5. Seven and four are how many?
6. Six and two are how many?
7. Six and four are how many?
8. Five and five are how many?
9. Four and six are how many?
10. Four and seven are how many?
11. Five and six are how many?
12. Six and two and two are how many?
13. Six and two and three are how many?
14. Six and four and one are how many?
15. Six and four and two are how many?
16. Five and five and one are how many?
17. Five and five and three are how many?
18. Four and six and one are how many?
19. One and four and six are how many?
20. Four and one and seven are how many?
21. One and seven and four are how many?
22. Five and six and one are how many?
23. Two and five and six are how many?
24. Three and five and six are how many?
25. Three and five and four are how many?

EXERCISE 5 (Oral)

How many are :

- | | | | | |
|-----|-----------------|-----------|-----------------|-----------|
| 1. | 1 and 1 ? | 1 and 3 ? | 1 and 5 ? | 1 and 8 ? |
| 2. | 2 and 2 ? | 2 and 4 ? | 2 and 6 ? | 2 and 8 ? |
| 3. | 1 and 4 ? | 1 and 9 ? | 3 and 1 ? | 3 and 3 ? |
| 4. | 3 and 5 ? | 3 and 6 ? | 3 and 8 ? | 3 and 2 ? |
| 5. | 4 and 1 ? | 4 and 3 ? | 4 and 5 ? | 4 and 4 ? |
| 6. | 4 and 7 ? | 4 and 2 ? | 5 and 1 ? | 5 and 3 ? |
| 7. | 5 and 5 ? | 5 and 6 ? | 5 and 2 ? | 6 and 2 ? |
| 8. | 6 and 4 ? | 6 and 3 ? | 7 and 3 ? | 3 and 7 ? |
| 9. | 7 and 4 ? | 4 and 7 ? | 7 and 5 ? | 5 and 7 ? |
| 10. | 8 and 2 ? | 2 and 8 ? | 9 and 1 ? | 2 and 9 ? |
| 11. | 3 and 1 and 1 ? | | 4 and 1 and 1 ? | |
| 12. | 4 and 2 and 2 ? | | 4 and 3 and 1 ? | |
| 13. | 5 and 3 and 3 ? | | 3 and 5 and 2 ? | |
| 14. | 4 and 3 and 4 ? | | 2 and 3 and 4 ? | |
| 15. | 6 and 2 and 1 ? | | 6 and 1 and 1 ? | |
| 16. | 3 and 3 and 6 ? | | 3 and 6 and 3 ? | |
| 17. | 4 and 4 and 2 ? | | 4 and 4 and 3 ? | |
| 18. | 5 and 6 and 1 ? | | 5 and 6 and 3 ? | |
| 19. | 5 and 5 and 2 ? | | 5 and 5 and 4 ? | |
| 20. | 5 and 6 and 3 ? | | 4 and 6 and 7 ? | |
| 21. | 5 and 7 and 4 ? | | 5 and 7 and 6 ? | |
| 22. | 6 and 4 and 7 ? | | 6 and 5 and 7 ? | |

ARITHMETIC

EXERCISE 6 (Oral)

1. Seven less three are how many?
2. John had seven cents and spent three. How many cents had he left?
3. Eight less four are how many?
4. Alice had eight plums and gave Mary four. How many plums has Alice?
5. Nine less four are how many?
6. A boy caught nine fish and gave four to his brother. How many did he keep?
7. Four less one are how many?
8. Mary had four roses and gave away one. How many had she left?
9. Eleven less five are how many?
10. Henry had eleven cents and gave five for a pencil. How many cents did he then have?
11. Nine less six are how many?
12. A girl had nine sticks of candy and gave six to her schoolmates. How many did she keep?
13. Ten less four are how many?
14. If a boy has ten cents and gives five cents for a newspaper, how many cents has he left?
15. Ten less three are how many?
16. If a boy has ten cents and gives three cents for an apple, how much has he left?

EXERCISE 7 (Oral)

1. Eight less three are how many?
2. A boy had eight marbles and lost three. How many marbles did he then have?
3. Nine less three are how many?
4. Henry bought nine fishhooks and broke three. How many fishhooks has Henry?
5. How many are ten less two?
6. There were ten birds in a tree and two flew away. How many birds remained in the tree?
7. Ten less four are how many?
8. Oscar has ten cents and James has four cents. How many more cents has Oscar than James?
9. Nine less five are how many?
10. Henry had nine cents and spent five. How many cents had he left?
11. Nine less two are how many?
12. Nine boys were in school yesterday, two of them are out of school to-day. How many boys are in school to-day?
13. Ten less five are how many?
14. A farmer had ten cows and sold five. How many cows had he left?
15. How many are nine less four?
16. A man had nine houses and sold four of them. How many houses had he left?

ARITHMETIC

EXERCISE 8 (Oral)

Read and give the correct number in each blank :

1. 2 and — are 4. 2 and — are 6.
2. 2 and — are 7. 2 and — are 9.
3. 3 and — are 6. 3 and — are 8.
4. 4 and — are 5. 4 and — are 10.
5. 5 and — are 7. 5 and — are 8.
6. 1 and — are 8. 1 and — are 6.
7. 6 and — are 9. 6 and — are 10.
8. 2 and — are 8. 1 and — are 10.
9. 7 and — are 9. 7 and — are 10.
10. 4 and — are 9. 1 and — are 7.
11. 5 and — are 9. 6 and — are 8.
12. 4 and — are 7. 3 and — are 10.
13. When a pint of milk sells for 4 cents, how much will two pints cost?
14. What is the value of three two-cent stamps?
15. What is the value of two three-cent stamps?
16. What is the value of three three-cent stamps?
17. What is the value of two four-cent stamps?
18. What is the value of two five-cent stamps?
19. What will two pounds of sugar cost at 5 cents a pound?
20. What will two pounds of rice cost at 5 cents a pound.

EXERCISE 9 (Written)

Add:

3	2	3	4	3	5	7	1	2	3	5
2	4	4	3	3	1	1	9	7	5	4
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
6	3	4	7	2	9	3	7	1	1	4
3	6	5	2	8	1	7	3	6	7	4
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

SUBTRACTION

Subtract means take away.

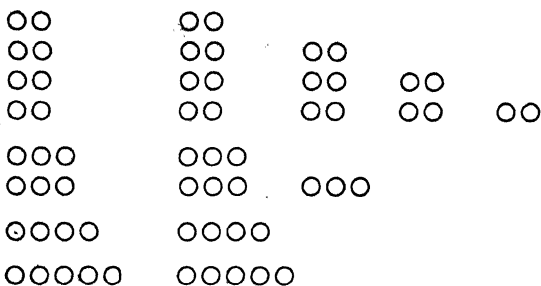
Thus if we subtract three from seven, we get four.

We may say seven less three equals how many? or, three and what number equal seven? These are really two different ways of doing the same thing; the answer to each of the two questions is four.

NOTE TO TEACHER. As this fact is the basis of the **additive** method of subtraction, it should be emphasized.

Subtract:

9	10	9	10	10	10	8	8	10	10	9
2	2	3	3	4	7	7	3	8	5	4
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
8	8	8	8	7	7	7	7	6	6	6
2	1	5	6	2	4	5	6	3	2	4
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
6	5	5	5	7	9	10	8	6	4	6
1	3	4	5	7	9	10	8	6	4	5
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
10	2	4	9	3	9	4	2	9	4	3
9	1	3	7	2	8	1	2	6	2	3

EXERCISE 10 (Oral)

1. Two and two are how many?
2. How many twos make four?
3. Two and two and two are how many?
4. How many twos make six?
5. Two, two, two, and two are how many?
6. How many twos make eight?
7. Two, two, two, and two and two are how many?
8. How many twos make ten?
9. Three and three are how many?
10. How many threes make six?
11. Four and four are how many?
12. How many fours make eight?
13. Five and five are how many?
14. How many fives make ten?
15. Count by twos to ten, beginning with two.
16. Count by twos to nine, beginning with one.
17. Three, three, and three are how many?
18. How many threes make nine?

19. Count by threes to nine.
20. How many are two twos and three?
21. How many are two threes and two?
22. How many are two fours and one?
23. How many are two twos and five?
24. How many are two twos and four?
25. How many are three ones and four?
26. How many are three twos and four?
27. How many are two fours and two?
28. How many cents are in a dime?
29. How many four-cent stamps can I buy for eight cents?
30. How many one-cent stamps can I buy for a dime?
31. How many two-cent stamps can I buy for a dime?
32. How many five-cent stamps can I buy for a dime?
33. How many three-cent stamps can I buy for nine cents?
34. How many six-cent stamps can I buy for twelve cents?
35. How much shall I pay for a two-cent, a three-cent, and a four-cent stamp?
36. How much shall I pay for a five-cent, a three-cent, and a two-cent stamp?

EXERCISE 11 (Oral)**Add:** (If necessary, develop by use of objects.)

3	2	1	3	4	2	3	3	4	2	3
2	2	2	3	3	1	2	1	2	1	2
1	1	1	2	2	2	1	3	1	4	3
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

1	1	2	3	3	3	5	6	6	6	7
4	3	3	5	4	2	1	4	3	5	2
2	4	4	4	5	5	2	1	2	1	1
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

6	6	6	6	6	6	5	5	2	8	7
4	5	3	4	3	4	3	3	5	3	2
2	2	4	5	3	3	3	2	6	6	2
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

7	8	9	7	8	7	8	7	6	6	7
2	3	2	3	4	5	6	5	6	7	4
1	4	1	4	2	3	4	3	3	2	5
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

5	8	9	3	7	3	5	6	7	7	8
2	1	3	5	2	6	2	3	4	4	3
5	3	2	4	1	1	5	6	5	4	1

The sign 0 is called Zero, or Naught. 0 stands for nothing. Therefore, if 0 is added to five, the answer is five.

NOTE. The teacher should discuss this property of Zero with the class until the pupils have it firmly in mind.

EXERCISE 12 (Written)

Add :

5	5	5	5	5	5	5	5	5	5	1
1	5	1	4	1	3	1	3	2	2	8
1	0	2	1	3	2	4	1	1	2	1
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

1	1	2	1	2	6	2	6	6	6	7
7	6	7	6	6	1	4	4	2	1	1
1	1	1	1	1	1	1	1	2	3	1
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

3	3	3	3	3	3	3	3	3	3	3
1	2	7	5	4	3	5	3	1	4	3
1	5	0	2	2	3	1	2	6	1	4
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

2	2	2	2	2	2	2	2	2	2	2
1	6	5	4	3	3	3	1	2	5	8
7	2	3	4	5	4	3	4	5	1	0
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

6	6	6	6	7	7	8	9	7	1	1
2	4	1	1	1	3	1	1	1	1	1
2	0	3	2	1	0	1	0	2	8	5
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

1	1	2	3	0	0	2	6	5	8	2
3	1	2	0	3	2	6	0	3	0	1
3	1	2	7	7	8	3	2	0	2	5
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

NOTE TO TEACHER. In adding columns of figures, the sums only should be named. Thus, in adding 3, 4, 2, the pupil should say, three, seven, nine.

EXERCISE 13 (Oral)**NUMBERS FROM TEN TO TWENTY**

○○○○○○○○○○○ ○ 11
 ○○○○○○○○○○○ ○○ 12
 ○○○○○○○○○○○ ○○○ 13
 ○○○○○○○○○○○ ○○○○ 14
 ○○○○○○○○○○○ ○○○○○ 15
 ○○○○○○○○○○○ ○○○○○○ 16
 ○○○○○○○○○○○ ○○○○○○○ 17
 ○○○○○○○○○○○ ○○○○○○○○ 18
 ○○○○○○○○○○○ ○○○○○○○○○ 19
 ○○○○○○○○○○○ ○○○○○○○○○○ 20

Eleven means ten and one.

Twelve means ten and two.

Thirteen means ten and three.

Fourteen means ten and four.

Fifteen means ten and five.

Sixteen means ten and six.

Seventeen means ten and seven.

Eighteen means ten and eight.

Nineteen means ten and nine.

Twenty means two tens, or ten and ten.

What number comes next after thirteen? What number comes next after fifteen? What number comes next after sixteen? What is the next number after eighteen? What is the next number after seventeen? What is the next number after eleven? What is the next number after fourteen? What

number is next after twelve? What number is next after nineteen? What number comes next before thirteen? What number comes next before fifteen? What number comes next before seventeen? What number comes next before eleven? What number comes next before twenty? What number comes next before sixteen? What number comes next before nineteen? What number comes next before eighteen?

1. How many are eleven and two?
2. How many are thirteen and two?
3. How many are fifteen and two?
4. How many are seventeen and two?
5. How many are twelve and two?
6. How many are fourteen and two?
7. How many are sixteen and two?
8. How many are eighteen and two?
9. How many are twelve and four?
10. How many are thirteen and five?
11. How many are eleven and six?
12. How many are fifteen and four?
13. How many are sixteen and three?
14. How many are fourteen and five?

NOTATION

Thirteen is written 13.

Fifteen is written 15.

Seventeen is written 17.

Nineteen is written 19.

Fourteen is written 14.

Sixteen is written 16.

Eighteen is written 18.

Twenty is written 20.

EXERCISE 14 (Written)

Fill in blanks :

1. Ten and — make 13.
2. Ten and — make 16.
3. Ten and — make 15.
4. Ten and — make 18.
5. Ten and — make 17.
6. Ten and — make 11.
7. Ten and — make 12.
8. Ten and — make 19.
9. Ten and — make 14.
10. Ten and — make 20.
11. Sixteen less — makes 6.
12. Nineteen less — makes 9.
13. Fourteen less — makes 4.
14. Fifteen less — makes 5.
15. Eighteen less — makes 10.
16. Seventeen less — makes 10.
17. Twelve less — makes 10.
18. Thirteen less — makes 10.
19. Eleven less — makes 10.
20. Twenty less — makes 10.
21. Five and — make 13.
22. Eight and — make 14.
23. Four and — make 12.

EXERCISE 15 (Oral)

How many are:

7 and 3?	6 and 5?	12 and 3?
7 and 5?	9 and 2?	3 and 12?
6 and 6?	9 and 4?	7 and 7?
8 and 3?	2 and 9?	8 and 8?
3 and 8?	3 and 10?	12 and 4?
8 and 4?	11 and 2?	4 and 12?
4 and 8?	2 and 11?	8 and 6?
5 and 8?	12 and 2?	9 and 6?
5 and 9?	2 and 12?	7 and 8?

The sign $+$ is called **plus**. When $+$ is written between two numbers it shows that they are to be added.

The sign $=$ means **is, are, equal, or equals**.

Thus, $6 + 4 = 10$ is read, six and four are ten.

Six plus four equals ten, or 6 and 4 equal 10.

DRILL WORK

$6 + 4 = ?$	$8 + 4 = ?$	$2 + 11 = ?$	$10 + 5 = ?$
$3 + 7 = ?$	$9 + 3 = ?$	$9 + 5 = ?$	$7 + 8 = ?$
$2 + 8 = ?$	$6 + 6 = ?$	$8 + 6 = ?$	$6 + 9 = ?$
$4 + 6 = ?$	$7 + 6 = ?$	$7 + 7 = ?$	$5 + 10 = ?$
$5 + 5 = ?$	$8 + 5 = ?$	$6 + 8 = ?$	$4 + 11 = ?$
$6 + 5 = ?$	$9 + 4 = ?$	$5 + 9 = ?$	$3 + 12 = ?$
$8 + 3 = ?$	$6 + 7 = ?$	$4 + 10 = ?$	$8 + 8 = ?$
$9 + 2 = ?$	$5 + 8 = ?$	$3 + 11 = ?$	$7 + 9 = ?$
$7 + 4 = ?$	$4 + 9 = ?$	$8 + 7 = ?$	$6 + 10 = ?$

EXERCISE 16 (Oral)

1. A farmer has six bushels of corn and five bushels of oats; he mixes them for feed for his horses. How many bushels of feed has he?

2. A farmer has eight cows in one pasture and six in another. How many cows has he in all?

3. Harry has six cents in one pocket and nine in another. How many cents has he in all?

4. There are seven geese in one flock and eight in another. How many geese in all?

5. If one quart of milk costs five cents, how many cents will two quarts cost?

6. If one pound of cherries costs eight cents, how many cents will two pounds cost?

7. One loaf of bread costs eight cents; another loaf of bread costs nine cents. How many cents do both loaves cost?

8. How many cents will you pay for three newspapers at three cents apiece?

9. A boy rode his bicycle seven miles in the morning and four miles in the afternoon. How many miles did he ride in all?

10. Henry walks nine blocks to school and nine blocks home. How many blocks does he walk in all?

11. There are nine chairs in one room and seven in another. How many chairs in both rooms?

12. Suppose there are eleven books on one shelf and four on another. How many books on both shelves?

13. If there are six rooms on the first floor of a house and eleven on the second floor, how many rooms in the house?

14. There are two schoolhouses; one has twelve rooms, the other has seven. How many rooms in both?

15. One train has eight cars, another has twelve. How many cars in both trains?

EXERCISE 17 (Oral)

1. William has seven marbles. How many must he buy to make eleven?

2. John has six nickels in his bank. How many more must he put into his bank to make twelve?

3. A newsboy had thirteen papers and sold nine. How many more has he to sell?

4. A man gave a dime for a newspaper that cost three cents. How many cents change did he get?

5. Henry had fifteen cents; he gave six cents for two pencils. How many cents had he left?

6. A farmer had sixteen sheep and sold nine. How many sheep has he left?

7. A farmer had seventeen tons of hay and sold nine. How many tons of hay were left?

8. There are eighteen rows of corn in a garden. If a boy hoes nine rows in the morning, how many must he hoe in the afternoon to finish?

9. If a man has thirteen dollars and buys a suit of clothes for five dollars, how many dollars has he left?

10. A man had fourteen cattle and sold seven. How many cattle has he left?

11. There are seventeen acres of land in a field; six acres are planted in corn and the remainder in oats. How many acres are planted in oats?

12. There are eighteen acres in a field. A boy plowed seven acres one week. How many acres remained to be plowed?

13. If there were nineteen desks in the schoolroom and twelve were taken out, how many are there now in the schoolroom?

14. A man had seventeen goats and sold eight. How many goats has he now?

15. There are sixteen pupils in the room; five of them are girls. How many boys in the room?

16. There are seventeen desks in a room. If four are removed, how many will remain?

17. A man has a ten-dollar bill and a five-dollar bill. How much would he have after paying for a suit of clothes costing twelve dollars?

18. A boy has sixteen cents. How many cents will he have when he spends five cents?

EXERCISE 18 (Oral)

1. How many are 4 and 3 and 5? 4, 3, and 9? 8, 3, and 4? 8, 3, and 7? 8, 3, and 9? 9, 3, and 5? 9, 3, and 8? 3, 4, and 8? 3, 4, and 6? 7, 5, and 7? 6, 5, and 9? 2, 6, and 7? 2, 6, and 9? 3, 6, and 7? 3, 6, and 9? 4, 6, and 8? 4, 6, and 9? 5, 6, and 9? 6, 8, and 5? 6, 7, and 7? 8, 3, and 8? 3, 8, and 3? 7, 2, and 8? 5, 2, and 7? 9, 4, and 2? 2, 9, and 3? 3, 7, and 2? 2, 8, and 3? 6, 2, and 5? 6, 2, and 7? 9, 3, and 8? 7, 8, and 4?

2. How many are 9, 3, and 3? 5, 9, and 5? 7, 6, and 7? 7, 2, and 7? 8, 4, and 8?

3. How many are 9, 2, and 9? 8, 9, and 3? 6, 9, and 5? 3, 9, and 8? 9, 6, and 5? 9, 4, and 7? 9, 3, and 6? 8, 7, and 4? 5, 7, and 6? 8, 2, and 3? 4, 8, and 3? 6, 3, and 8?

4. How many are 4, 3, and 7? 3, 6, and 6? 7, 6, and 6? 8, 6, and 6? 6, 7, and 6? 8, 8, and 3? 8, 5, and 7? 7, 6, and 5? 9, 6, and 2? 9, 8, and 2? 4, 8, and 8? 1, 9, and 9?

5. How many are 3, 8, and 9? 3, 6, and 9? 3, 3, and 8? 2, 2, and 9? 1, 1, and 9? 1, 1, and 7? 2, 2, and 5? 6, 6, and 1? 7, 7, and 2? 7, 4, and 7? 7, 7, and 5? 8, 8, and 1?

Add:

3	9	3	9	4	9
1	1	1	1	1	1
8	6	9	5	6	4

5	8	5	8	5	8
1	1	1	1	1	1
5	6	6	5	7	4
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
5	8	5	8	5	7
1	1	1	1	1	1
8	3	9	2	4	9
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
6	7	6	7	6	7
5	8	6	7	7	6
1	1	1	1	1	1
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
5	5	5	5	6	6
3	3	3	3	3	3
6	7	8	9	7	8
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
7	7	7	7	7	7
3	3	3	3	3	3
4	5	6	7	3	9
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
2	2	2	2	2	8
4	4	4	4	4	1
5	6	7	8	9	9
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
5	5	5	7	7	7
6	6	6	6	6	6
7	8	9	6	7	5
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3	3	3	4	4	4
7	7	7	7	7	7
6	7	8	9	6	7

EXERCISE 19 (Written)

- | | | |
|--------------------|---------------------|---------------------|
| 1. $3 + 3 + 5 = ?$ | 10. $5 + 5 + 9 = ?$ | 19. $7 + 7 + 6 = ?$ |
| 2. $3 + 3 + 7 = ?$ | 11. $6 + 6 + 1 = ?$ | 20. $8 + 8 + 1 = ?$ |
| 3. $3 + 3 + 9 = ?$ | 12. $6 + 6 + 3 = ?$ | 21. $8 + 8 + 3 = ?$ |
| 4. $4 + 4 + 4 = ?$ | 13. $6 + 6 + 5 = ?$ | 22. $8 + 8 + 4 = ?$ |
| 5. $4 + 4 + 6 = ?$ | 14. $6 + 6 + 6 = ?$ | 23. $9 + 9 + 1 = ?$ |
| 6. $4 + 4 + 8 = ?$ | 15. $6 + 6 + 8 = ?$ | 24. $9 + 9 + 2 = ?$ |
| 7. $5 + 5 + 3 = ?$ | 16. $7 + 7 + 1 = ?$ | 25. $8 + 2 + 6 = ?$ |
| 8. $5 + 5 + 5 = ?$ | 17. $7 + 7 + 3 = ?$ | 26. $8 + 2 + 9 = ?$ |
| 9. $5 + 5 + 7 = ?$ | 18. $7 + 7 + 5 = ?$ | 27. $6 + 2 + 9 = ?$ |

EXERCISE 20 (Oral)

1. Jennie bought thirteen plums, and gave Alice five of them. How many plums did Jennie keep?
2. Oscar had fifteen cents and lost eight cents. How many cents did he then have?
3. A farmer planted seventeen acres in corn and cotton; six acres were corn. How many acres did the farmer plant in cotton?
4. A trader bought eighteen calves and sold nine of them. How many calves did the trader then have?
5. A farmer's wife raised seventeen turkeys; she sold eight of them to a neighbor and kept the remainder. How many did she keep?

What does **subtract** mean? Subtraction is finding the **difference** between two numbers. Thus the difference between 6 and 4 is 2.

Copy and subtract:

6.	$\begin{array}{r} 16 \\ 5 \end{array}$	$\begin{array}{r} 16 \\ 7 \end{array}$	$\begin{array}{r} 16 \\ 9 \end{array}$	$\begin{array}{r} 15 \\ 6 \end{array}$	$\begin{array}{r} 14 \\ 8 \end{array}$
7.	$\begin{array}{r} 14 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 9 \\ \hline \end{array}$
8.	$\begin{array}{r} 18 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 11 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 12 \\ \hline \end{array}$
9.	$\begin{array}{r} 19 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 13 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 4 \\ \hline \end{array}$
10.	$\begin{array}{r} 15 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 7 \\ \hline \end{array}$

The sign $-$ is called **minus** or **less**. When $-$ is written between two numbers, it shows that the number on the right is to be subtracted from the number on the left. Thus, $5-2$ is read, five minus two, or five less two, and means that 2 is to be subtracted from 5.

DRILL WORK

Read and give the answers:

$8-3=?$	$13-5=?$	$9-6=?$	$11-6=?$
$11-4=?$	$14-3=?$	$10-7=?$	$7-4=?$
$6-5=?$	$12-8=?$	$8-4=?$	$5-3=?$
$15-10=?$	$8-7=?$	$9-5=?$	$10-9=?$

EXERCISE 21 (Oral)

12 inches (in.) = 1 foot (ft.).

The number produced by adding two or more numbers is called the **sum**.

1. What is the sum of six inches and six inches?
2. How many inches are two times six inches?
3. How many inches are in one half of a foot?
4. What is the sum of four inches, four inches, and four inches?
5. A foot is how many times four inches?
6. What part of a foot is four inches?
7. What is one half of four inches?
8. What is one half of six inches?
9. What is one half of eight inches?
10. What is one half of ten inches?
11. What is the sum of two inches, two inches, and two inches?
12. Six inches is how many times two inches?
13. What is one third of six inches?
14. What part of six inches is two inches?
15. What is the sum of three inches, three inches, and three inches?
16. What is one third of nine inches?
17. How many inches are three inches, three inches, three inches, and three inches?

NOTE TO TEACHER. For this exercise the student should use a foot rule.

18. Twelve inches is how many times three inches?
19. What is one fourth of twelve inches?
20. What part of a foot is three inches?
21. How many six-inch lengths are in one foot?
22. How many four-inch lengths are in one foot?
23. How many three-inch lengths are in one foot?
24. One third of $12 = ?$
25. One half of $12 = ?$
26. One fourth of $12 = ?$
27. One fourth of $8 = ?$
28. One half of $10 = ?$
29. One half of $20 = ?$

One half is written $\frac{1}{2}$.

One third is written $\frac{1}{3}$.

One fourth is written $\frac{1}{4}$.

EXERCISE 22 (Oral)

○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

Count by twos to twenty. How many twos are in twenty?

○○○ ○○○ ○○○ ○○○ ○○○ ○○○

Count by threes to eighteen. How many threes are in eighteen? How many threes are in fifteen?

○○○○ ○○○○ ○○○○

Count by fours to twelve. How many fours are in twelve? What is $\frac{1}{3}$ of twelve?

Count by fours to sixteen. How many fours are in sixteen? What is $\frac{1}{4}$ of sixteen?

Count by fours to twenty. How many fours are in twenty?

○○○○○ ○○○○○ ○○○○○

Count by fives to fifteen. How many fives in fifteen?

Count by fives to twenty. How many fives in twenty?

What is the sum of 2 and 2? What is one half of 4? How many twos make four?

What is the sum of 3 and 3? What is one half of 6? How many 3's make 6?

What is the sum of 4 and 4? What is one half of 8? How many 4's make 8?

What is the sum of 5 and 5? What is one half of 10? How many 5's make 10?

What is the sum of 7 and 7? What is one half of 14? How many 7's make 14?

What is the sum of 8 and 8? What is one half of 16? How many 8's make 16?

What is the sum of 9 and 9? What is one half of 18? How many 9's make 18?

What is the sum of 10 and 10? What is one half of 20? How many 10's make 20?

EXERCISE 23 (Oral)

What is the sum of 2 and 2? How many are two times two?

What is the sum of 2, 2, and 2? How many are 3 times 2?

What is the sum of 2, 2, 2, and 2? How many are 4 times 2?

$2+2+2+2+2=?$ How many are 5 times 2?

$2+2+2+2+2+2=?$ How many are 6 times 2?

How many are 7 times 2? 8 times 2? 9 times 2?

10 times 2?

$3+3=?$ How many are 2 times 3?

$3+3+3=?$ How many are 3 times 3?

$3+3+3+3=?$ How many are 4 times 3?

$3+3+3+3+3=?$ How many are 5 times 3?

How many are 6 times 3?

$4+4=?$ How many are 2 times 4?

$4+4+4=?$ How many are 3 times 4?

$4+4+4+4=?$ How many are 4 times 4.

How many are 5 times 4?

$5+5=?$ How many are 2 times 5?

$5+5+5=?$ How many are 3 times 5?

How many are 4 times 5?

$6+6=?$ How many are 2 times 6?

$6+6+6=?$ How many are 3 times 6?

The sign \times written between two numbers means **times**, or **multiplied by**. Thus, $2 \times 2 = 4$ is read, two times two are four.

EXERCISE 24 (Written)

Copy and complete :

$2 \times 2 = ?$

$7 \times 2 = ?$

$4 \times 3 = ?$

$2 \times 3 = ?$

$2 \times 8 = ?$

$3 \times 5 = ?$

$3 \times 2 = ?$

$8 \times 2 = ?$

$5 \times 3 = ?$

$2 \times 4 = ?$

$2 \times 9 = ?$

$3 \times 6 = ?$

$4 \times 2 = ?$

$9 \times 2 = ?$

$6 \times 3 = ?$

$2 \times 5 = ?$

$10 \times 2 = ?$

$4 \times 3 = ?$

$5 \times 2 = ?$

$2 \times 10 = ?$

$4 \times 5 = ?$

$2 \times 6 = ?$

$3 \times 3 = ?$

$5 \times 4 = ?$

$2 \times 7 = ?$

$3 \times 4 = ?$

$7 \times 1 = ?$

How many 2's in 6?

How many 2's in 10?

How many 2's in 14?

How many 2's in 18?

How many 2's in 20?

How many 3's in 6?

How many 3's in 12?

How many 3's in 15?

How many 3's in 18?

How many 4's in 8?

How many 4's in 12?

How many 4's in 16?

How many 4's in 20?

How many 5's in 10?

How many 5's in 15?

How many 5's in 20?

EXERCISE 25 (Oral)

1. A loaf of bread costs 5¢. What will 3 loaves cost? (¢ stands for cent or cents.)

2. If a doll costs 6¢, what will 3 dolls cost?

3. If a man earns \$2 a day, how much will he earn in 4 days? (\$ stands for dollar or dollars.)

4. If a farmer earns \$3 a day, how much will he earn in 4 days?

5. A man sells 4 calves for \$4 each. How much does he get for his calves?

6. If eggs sell for 3¢ apiece, what will six eggs cost?

7. When sugar sells at 5¢ a pound, what will 4 pounds cost?

8. If land rents for \$3 an acre, for how much will 6 acres rent?

9. If a boy can walk 3 miles in an hour, how far can he walk in 3 hours?

10. How much will 2 five-cent stamps and 3 two-cent stamps cost?

11. How much will 4 three-cent stamps and 1 two-cent stamp cost?

12. If two pencils cost 10¢, what will one pencil cost?

13. If two blank books cost 16¢, what will one blank book cost?

14. If two copy books cost 20¢, what will one copy book cost?

15. If two bottles of ink cost 8¢, what will one bottle cost?

16. If two tops cost 14¢, what will one top cost?

17. When two yards of calico cost 18¢, what will one yard cost?

18. If a pair of shoes cost \$3, how many pairs can be bought for \$6?

19. If a horse travels 12 miles in 2 hours, how far will he go in one hour?

EXERCISE 26 (Written)

Copy and complete :

$$3 + 3 + 2 = \qquad 4 + 6 + 6 =$$

$$4 + 4 + 3 = \qquad 5 + 7 + 7 =$$

$$5 + 5 + 1 = \qquad 1 + 9 + 9 =$$

$$6 + 6 + 5 = \qquad 1 + 8 + 8 =$$

$$6 + 6 + 3 = \qquad 1 + 7 + 7 =$$

$$7+7+2=$$

$$7+7+4=$$

$$7+7+6=$$

$$7+7+3=$$

$$8+8+1=$$

$$8+8+3=$$

$$8+8+2=$$

$$9+9+1=$$

$$9+9+2=$$

$$4+8+8=$$

$$3+7+7=$$

$$3+6+6=$$

$$5+6+6=$$

$$4+7+7=$$

$$4+5+5=$$

$$2+8+8=$$

$$2+6+6=$$

$$2+5+5=$$

$$2+4+4+4=$$

$$2+5+5+5=$$

$$2+6+6+6=$$

$$3+4+4+4=$$

$$3+5+5+5=$$

$$4+4+4+5=$$

$$5+4+4+4=$$

$$2+2+2+2+1=$$

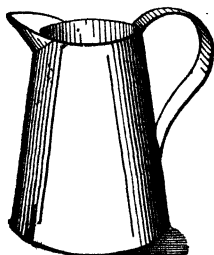
$$3+3+3+3+1=$$

$$4+4+4+4+2=$$

$$3+3+3+3+2=$$

$$4+4+4+4+3=$$

EXERCISE 27 (Oral)



GALLON



QUART



PINT

$$2 \text{ pints (pt.)} = 1 \text{ quart (qt.)}$$

$$4 \text{ quarts} = 1 \text{ gallon (gal.)}$$

How many pints in 2 quarts? How many pints in 3 quarts? How many pints in 4 quarts? How many pints in 5 quarts? How many pints in 6

quarts? How many pints in 7 quarts? How many pints in 8 quarts?

How many quarts in 2 gallons? How many quarts in 3 gallons? How many quarts in 4 gallons? How many quarts in 5 gallons?

How many pints in 4 quarts? How many pints in 1 gallon?

How many pints in 1 gallon and 1 quart?

How many pints in 2 quarts and 1 pint? How many pints in 3 quarts and 1 pint? How many pints in 1 gallon and 2 quarts?

What part of a quart is a pint? What part of a gallon is 2 quarts? How many pints in a half gallon?

1. If a pint of milk sells for 3¢, for what will a quart sell?

2. If a quart of milk sells for 5¢, for what will a gallon sell?

3. If a quart of milk costs 4¢, what will a half gallon cost?

4. One quart is drawn out of a can containing 1 gallon of molasses. How many quarts of molasses remain in the can?

5. If you take 1 pint of oil out of a can containing a half gallon, how many pints of oil will remain in the can?

6. If a pint of milk costs four cents, what will three pints cost?

7. If a quart of kerosene costs five cents, what will two quarts cost? Three quarts?

8. Three pints of milk are sold from a can containing a gallon. How many pints remain in the can?

9. If three pints and two pints of vinegar are poured from a jug containing a gallon, how many pints remain?

10. How many quarts in two gallons and three quarts?

11. How many quarts in three gallons and one quart?

12. How many quarts in three gallons and three quarts?

13. How many pints in four quarts and one pint?

14. How many pints in six quarts and one pint?

15. How many pints in one gallon and one quart?

16. How many pints in one gallon and three quarts?

17. How many pints in two gallons and one quart?

18. If three quarts are taken out of a can containing one gallon and two quarts, how many quarts remain?

19. How many two-quart bottles can a grocer fill from a four-gallon cask full of vinegar?

20. Eight quarts are how many gallons?

21. Twelve quarts are how many gallons?

22. Sixteen quarts are how many gallons?

EXERCISE 28 (Oral)

1. How many 2's in 5? 7? 9? 11? 13? 15?
2. How many 3's in 5? 8? 10? 13? 17? 19?
3. How many 4's in 7? 11? 9? 15? 14? 17?
4. How many 5's in 9? 11? 13? 16? 18? 17?
12?
5. How many 6's in 16? 19? 20? 13? 14? 15?
6. How many 7's in 13? 15? 17? 19? 20? 9?
7. How many 8's in 11? 14? 17? 15? 18? 20?
19?
8. How many 9's in 13? 17? 15? 19? 20? 16?
10?
9. How many times is 3 in. contained in 12 in.?
10. How many times is 4 in. contained in 12 in.?
11. How many times is 4 in. contained in 16 in.?
12. How many times is 4 in. contained in 1 ft.?
13. How many times is 6 in. contained in 1 ft.?
14. How many times is 6 in. contained in one and
one half feet?
15. How many times is 3 in. contained in one and
one half feet?
16. How many times is 3 in. contained in 15 in.?
17. How many times is 4 in. contained in 20 in.?
18. How many times is 5 in. contained in 15 in.?

NOTE. Use a foot rule if you cannot give the answers without.

EXERCISE 29 (Oral and Written)

Twenty-one means twenty and one, and is written
21.

Twenty-two means twenty and two, and is written
22.

Twenty-three means twenty and three, and is
written 23.

Twenty-four means twenty and four, and is written
24.

Twenty-five means twenty and five, and is written
25.

Twenty-six means twenty and six, and is written 26.

Twenty-seven means twenty and seven, and is
written 27.

Twenty-eight means twenty and eight, and is
written 28.

Twenty-nine means twenty and nine, and is written
29.

Thirty means three tens, and is written 30.

1. How many are:

19 and 1? 19 and 2? 19 and 3?

2. How many are:

18 and 2? 18 and 3? 18 and 4?

18 and 5? 18 and 6? 18 and 7?

18 and 8? 18 and 9? 18 and 10?

3. How many are:

17 and 3? 17 and 4? 17 and 5?

17 and 6? 17 and 7? 17 and 8?

4. How many are:

16 and 4? 16 and 5? 16 and 6? 16 and 7?

16 and 8? 16 and 9? 16 and 10?

5. How many are:

15 and 5? 15 and 6? 15 and 7?

15 and 8? 15 and 9? 15 and 10?

6. How many are:

14 and 6? 14 and 7? 14 and 8?

14 and 9? 14 and 10?

As we know, 0 is read zero, or naught. To subtract zero from a number means that we take nothing away from the number. Therefore the number is not changed. As zero stands for nothing, $5 - 0 = 5$.

ADDITION TABLE

1	1	1	1	1	1	1	1	1	1	1	1	1
0	1	2	3	4	5	6	7	8	9	10	11	12
2	2	2	2	2	2	2	2	2	2	2	2	2
0	1	2	3	4	5	6	7	8	9	10	11	12
3	3	3	3	3	3	3	3	3	3	3	3	3
0	1	2	3	4	5	6	7	8	9	10	11	12

FOOTNOTE TO TEACHER. The addition table should be put on the blackboard. Each pupil should be required to name the sum as the teacher touches at random the numbers to be added. This exercise should be continued until pupils can name instantly every sum in the table.

The property of zero mentioned on this page should be discussed with the class until they have it firmly in mind.

4	4	4	4	4	4	4	4	4	4	4	4	4
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
5	5	5	5	5	5	5	5	5	5	5	5	5
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
6	6	6	6	6	6	6	6	6	6	6	6	6
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
7	7	7	7	7	7	7	7	7	7	7	7	7
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
8	8	8	8	8	8	8	8	8	8	8	8	8
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
9	9	9	9	9	9	9	9	9	9	9	9	9
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
10	10	10	10	10	10	10	10	10	10	10	10	10
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
11	11	11	11	11	11	11	11	11	11	11	11	11
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
12	12	12	12	12	12	12	12	12	12	12	12	12
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>

EXERCISE 30 (Oral and Written)

1. Count to 30 by 2's, beginning at 16.
2. Count to 30 by 3's, beginning at 15.

3. Count to 30 by 4's, beginning at 14.
4. Count to 30 by 5's, beginning at 5.
5. Count to 30 by 6's, beginning at 6.
6. Count to 30 by 7's, beginning at 2.
7. Count to 30 by 8's, beginning at 6.
8. Count to 30 by 9's, beginning at 3.
9. Count to 30 by 10's.
10. Count to 30 by 3's, beginning at 3.
11. Count to 30 by 4's, beginning at 6.
12. Count to 30 by 5's, beginning at 5.
13. Count to 30 by 6's, beginning at 6.
14. Count to 30 by 7's, beginning at 9.
15. Count to 30 by 8's, beginning at 14.
16. Count to 30 by 9's, beginning at 12.
17. Count to 29 by 8's, beginning at 5.
18. Count to 28 by 6's, beginning at 4.
19. Count to 27 by 5's, beginning at 2.
20. Count to 26 by 7's, beginning at 5.
21. Count to 28 by 9's, beginning at 1.
22. Count to 28 by 3's, beginning at 1.
23. Count to 25 by 8's, beginning at 1.
24. Count to 26 by 7's, beginning at 5.
25. Count to 29 by 7's, beginning at 1.
26. Count to 23 by 8's, beginning at 7.
27. Count to 24 by 9's, beginning at 6.
28. Count to 29 by 9's, beginning at 2.

29. How many are :

8 and 3? 8 and 13? 7 and 5? 7 and 15?

30. 9 and 7? 9 and 17? 8 and 18? 8 and 8?

31. 6 and 4? 6 and 14? 6 and 24? 5 and 16?

32. 5 and 9? 5 and 19? 4 and 7? 4 and 17?

33. 3 and 8? 3 and 18? 5 and 14? 5 and 24?

EXERCISE 31 (Written)

Write in a column and add :

- | | | |
|---------------------|---------------------|---------------------|
| 1. $7 + 5 + 9 = ?$ | 17. $6 + 7 + 8 = ?$ | 33. $9 + 5 + 8 = ?$ |
| 2. $7 + 8 + 8 = ?$ | 18. $6 + 7 + 9 = ?$ | 34. $9 + 5 + 9 = ?$ |
| 3. $7 + 9 + 7 = ?$ | 19. $6 + 8 + 9 = ?$ | 35. $9 + 7 + 8 = ?$ |
| 4. $7 + 8 + 9 = ?$ | 20. $6 + 8 + 8 = ?$ | 36. $9 + 6 + 8 = ?$ |
| 5. $6 + 9 + 7 = ?$ | 21. $8 + 6 + 7 = ?$ | 37. $9 + 8 + 6 = ?$ |
| 6. $6 + 9 + 8 = ?$ | 22. $8 + 7 + 6 = ?$ | 38. $9 + 7 + 7 = ?$ |
| 7. $6 + 9 + 9 = ?$ | 23. $8 + 6 + 8 = ?$ | 39. $9 + 6 + 6 = ?$ |
| 8. $7 + 6 + 8 = ?$ | 24. $8 + 7 + 7 = ?$ | 40. $9 + 6 + 9 = ?$ |
| 9. $7 + 9 + 8 = ?$ | 25. $8 + 7 + 8 = ?$ | 41. $9 + 6 + 7 = ?$ |
| 10. $7 + 7 + 9 = ?$ | 26. $8 + 8 + 7 = ?$ | 42. $9 + 9 + 6 = ?$ |
| 11. $6 + 4 + 9 = ?$ | 27. $7 + 7 + 7 = ?$ | 43. $9 + 7 + 6 = ?$ |
| 12. $5 + 9 + 7 = ?$ | 28. $8 + 7 + 9 = ?$ | 44. $9 + 8 + 8 = ?$ |
| 13. $5 + 8 + 9 = ?$ | 29. $8 + 9 + 7 = ?$ | 45. $9 + 8 + 9 = ?$ |
| 14. $5 + 8 + 8 = ?$ | 30. $8 + 9 + 8 = ?$ | 46. $9 + 9 + 9 = ?$ |
| 15. $5 + 9 + 8 = ?$ | 31. $8 + 9 + 9 = ?$ | 47. $7 + 9 + 7 = ?$ |
| 16. $5 + 7 + 9 = ?$ | 32. $9 + 4 + 8 = ?$ | 48. $7 + 8 + 9 = ?$ |

EXERCISE 32 (Oral and Written)

Copy and complete :

- | | | |
|-----------------|-----------------|-----------------|
| 1. $20 - 2 =$ | 19. $22 - 9 =$ | 37. $24 - 10 =$ |
| 2. $20 - 4 =$ | 20. $22 - 10 =$ | 38. $25 - 3 =$ |
| 3. $20 - 5 =$ | 21. $22 - 12 =$ | 39. $25 - 4 =$ |
| 4. $20 - 7 =$ | 22. $22 - 13 =$ | 40. $25 - 6 =$ |
| 5. $20 - 8 =$ | 23. $23 - 3 =$ | 41. $25 - 8 =$ |
| 6. $20 - 9 =$ | 24. $23 - 4 =$ | 42. $25 - 7 =$ |
| 7. $21 - 2 =$ | 25. $23 - 6 =$ | 43. $25 - 9 =$ |
| 8. $21 - 3 =$ | 26. $23 - 7 =$ | 44. $25 - 10 =$ |
| 9. $21 - 5 =$ | 27. $23 - 8 =$ | 45. $26 - 3 =$ |
| 10. $21 - 7 =$ | 28. $23 - 5 =$ | 46. $26 - 4 =$ |
| 11. $21 - 9 =$ | 29. $23 - 9 =$ | 47. $26 - 6 =$ |
| 12. $21 - 11 =$ | 30. $23 - 10 =$ | 48. $26 - 5 =$ |
| 13. $21 - 12 =$ | 31. $24 - 3 =$ | 49. $26 - 8 =$ |
| 14. $22 - 2 =$ | 32. $24 - 5 =$ | 50. $26 - 7 =$ |
| 15. $22 - 3 =$ | 33. $24 - 6 =$ | 51. $26 - 9 =$ |
| 16. $22 - 4 =$ | 34. $24 - 8 =$ | 52. $26 - 2 =$ |
| 17. $22 - 6 =$ | 35. $24 - 7 =$ | 53. $27 - 4 =$ |
| 18. $22 - 8 =$ | 36. $24 - 9 =$ | 54. $27 - 6 =$ |

1. A boy has two dimes and pays 5¢ for a newspaper. How much money has he left?

2. Harry has 20¢. If he buys two pencils at 3¢ each, how many cents has he left?

3. Mary has 25¢. If she buys 5¢ worth of ice cream, how much change should she get?

EXERCISE 33 (Written and Oral)

Solve these examples by counting the ○'s:

$$3 \times 6 =$$

○○○○○○ ○○○○○○ ○○○○○○

$$3 \times 5 =$$

○○○○○ ○○○○○ ○○○○○

$$9 \times 2 =$$

○○ ○○ ○○ ○○ ○○ ○○ ○○ ○○ ○○

$$6 \times 3 =$$

○○○ ○○○ ○○○ ○○○ ○○○ ○○○

$$5 \times 4 =$$

○○○○ ○○○○ ○○○○ ○○○○ ○○○○

$$9 \times 3 =$$

○○○ ○○○ ○○○ ○○○ ○○○ ○○○
 ○○○ ○○○ ○○○

$$3 \times 7 =$$

○○○○○○○ ○○○○○○○ ○○○○○○○

$$5 \times 5 =$$

○○○○○ ○○○○○ ○○○○○
 ○○○○○ ○○○○○

$$2 \times 9 =$$

○○○○○○○○○ ○○○○○○○○○○

$$7 \times 3 =$$

○○○ ○○○ ○○○ ○○○ ○○○ ○○○ ○○○

$$5 \times 6 =$$

○○○○○ ○○○○○ ○○○○○
 ○○○○○ ○○○○○ ○○○○○

$$3 \times 9 =$$

○○○○○○○○○ ○○○○○○○○○○
 ○○○○○○○○○○

$$6 \times 2 =$$

○○ ○○ ○○ ○○ ○○ ○○

$$2 \times 10 =$$

○○○○○○○○○○ ○○○○○○○○○

$$8 \times 3 =$$

○○○ ○○○ ○○○ ○○○ ○○○ ○○○
○○○ ○○○

$$6 \times 4 =$$

○○○○ ○○○○ ○○○○ ○○○○ ○○○○ ○○○○

$$2 \times 11 =$$

○○○○○○○○○○ ○○○○○○○○○

$$3 \times 9 =$$

○○○○○○○○ ○○○○○○○○
○○○○○○○○○

$$6 \times 5 =$$

○○○○○ ○○○○○ ○○○○○
○○○○○ ○○○○○ ○○○○○

$$2 \times 12 =$$

○○○○○○○○○○○○ ○○○○○○○○○○○

$$9 \times 3 =$$

○○○ ○○○ ○○○ ○○○ ○○○ ○○○
○○○ ○○○ ○○○

$$6 \times 3 =$$

○○○ ○○○ ○○○ ○○○ ○○○ ○○○

Use objects in solving these examples :

$$3 \times 10 =$$

$$4 \times 5 =$$

$$8 \times 2 =$$

$$2 \times 5 =$$

$$10 \times 3 =$$

$$7 \times 2 =$$

$$8 \times 3 =$$

$$3 \times 5 =$$

$$4 \times 4 =$$

$$7 \times 3 =$$

$$11 \times 2 =$$

$$2 \times 9 =$$

$$4 \times 6 =$$

$$7 \times 4 =$$

$$10 \times 2 =$$

$$4 \times 7 =$$

$$4 \times 7 =$$

$$7 \times 4 =$$

$5 \times 4 =$

$3 \times 8 =$

$6 \times 5 =$

$7 \times 4 =$

$9 \times 2 =$

$6 \times 3 =$

$6 \times 4 =$

$9 \times 1 =$

$7 \times 4 =$

$4 \times 3 =$

$4 \times 1 =$

$8 \times 3 =$

$3 \times 4 =$

$7 \times 1 =$

$9 \times 3 =$

EXERCISE 34 (Oral)

If a number is divided into two equal parts, one of these parts is called **one half**.

If a number is divided into three equal parts, one of these parts is called **one third**.

If a number is divided into four equal parts, one of these parts is called **one fourth**.

1. How many are:

Three 4's? Three 5's? Three 6's? Three 7's?

2. How many are:

Three 8's? Three 9's? Three 10's?

3. If 12 apples are divided equally among three boys, how many apples will each boy receive?

○○○○ ○○○○ ○○○○

4. What is one third of 12?

5. If fifteen oranges are divided equally among three girls, how many oranges will each girl receive?

○○○○○ ○○○○○ ○○○○○

6. What is one third of 15?

7. Divide 18¢ equally among three boys.

○○○○○○ ○○○○○○ ○○○○○○

8. What is one third of 18?

9. What is one third of 21?

○○○○○○○○ ○○○○○○○ ○○○○○○○

10. What is one third of 24?

○○○○○○○○ ○○○○○○○○ ○○○○○○○○

11. What is one third of 27?

○○○○○○○○○○ ○○○○○○○○○
○○○○○○○○○○

12. How many are :

Four 3's? Four 4's? Four 5's? Four 6's?

Four 7's?

13. If 12 marbles are divided equally among 4 boys, how many marbles will each boy receive?

○○○ ○○○ ○○○ ○○○

14. What is one fourth of 12?

15. What is one fourth of 16?

○○○○ ○○○ ○○○○ ○○○○

16. What is one fourth of 20?

○○○○○ ○○○○○ ○○○○○ ○○○○○

17. What is one fourth of 24?

○○○○○○ ○○○○○○ ○○○○○○ ○○○○○○

18. What is one half of 20?

○○○○○○○○○○ ○○○○○○○○○

19. What is one half of 24?

○○○○○○○○○○○○ ○○○○○○○○○○○○○

20. One half is written $\frac{1}{2}$.

21. One third is written $\frac{1}{3}$.

22. One fourth is written $\frac{1}{4}$.

EXERCISE 35

Copy and complete:

$\frac{1}{2}$ of 6 inches =	$\frac{1}{2}$ of \$10 =	$\frac{1}{4}$ of \$20 =
$\frac{1}{2}$ of 10 inches =	$\frac{1}{2}$ of \$16 =	$\frac{1}{4}$ of \$28 =
$\frac{1}{2}$ of 12 inches =	$\frac{1}{2}$ of \$18 =	$\frac{1}{3}$ of 18¢ =
$\frac{1}{3}$ of 6 inches =	$\frac{1}{2}$ of \$20 =	$\frac{1}{3}$ of 21¢ =
$\frac{1}{3}$ of 12 inches =	$\frac{1}{3}$ of \$9 =	$\frac{1}{3}$ of 27¢ =
$\frac{1}{3}$ of 18 inches =	$\frac{1}{3}$ of \$15 =	$\frac{1}{3}$ of 30¢ =
$\frac{1}{4}$ of 8 inches =	$\frac{1}{3}$ of \$24 =	$\frac{1}{4}$ of 8¢ =
$\frac{1}{4}$ of 12 inches =	$\frac{1}{3}$ of \$27 =	$\frac{1}{4}$ of 16¢ =
$\frac{1}{4}$ of 20 inches =	$\frac{1}{3}$ of \$30 =	$\frac{1}{4}$ of 24¢ =
$\frac{1}{4}$ of 24 inches =	$\frac{1}{4}$ of \$12 =	$\frac{1}{4}$ of 28¢ =

To **divide** 24 by 3 means to find out how many times 3 is contained in 24.

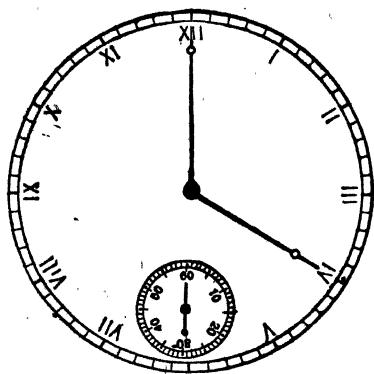
The sign for dividing is \div .

Thus $24 \div 3$ is read 24 divided by 3.

Copy and complete:

$15\text{¢} \div 3 =$	$12\text{¢} \div 4 =$	$14\text{¢} \div 2 =$	$24\text{¢} \div 3 =$
$21\text{¢} \div 3 =$	$20\text{¢} \div 4 =$	$15\text{¢} \div 3 =$	$24\text{¢} \div 4 =$
$18\text{¢} \div 3 =$	$24\text{¢} \div 4 =$	$18\text{¢} \div 3 =$	$28\text{¢} \div 4 =$
$24\text{¢} \div 3 =$	$28\text{¢} \div 4 =$	$27\text{¢} \div 3 =$	$16\text{¢} \div 4 =$
$27\text{¢} \div 3 =$	$18\text{¢} \div 2 =$	$12\text{¢} \div 3 =$	$20\text{¢} \div 4 =$

EXERCISE 36



There are 24 hours (hr.) in 1 day (da.).

There are 7 days (da.) in 1 week (wk.).

There are 12 months (mo.) in 1 year (yr.).

1. How many days in 2 weeks?

2. How many days in 3 weeks?

If we look at a watch or clock we see that the hands are not marked by the figures that we have just learned; but by letters. These letters used as signs for numbers are called **Roman Numerals**.

In Roman Numerals

I stands for 1.	VII stands for 7.
II stands for 2.	VIII stands for 8.
III stands for 3.	IX stands for 9.
IV or IIII stands for 4.	X stands for 10.
V stands for 5.	XI stands for 11.
VI stands for 6.	XII stands for 12.

Notice that when I comes before V or X, 1 is subtracted. Thus IV means $5 - 1$ or 4, and IX means $10 - 1$ or 9. When I comes after V or X it is to be added, thus VI means 6, VII means 7, XI means 11.

3. How many months in one half of a year?
4. How many months in one third of a year?
5. How many months in one fourth of a year?
6. Three months are what part of a year?
7. How many months are there from April to October?
8. How many months are there from November to March?
9. How many months are there in a year and a half?
10. How many months are there in one year and five months? One year and seven months? One year and nine months?
11. How many months in two years and two months? Two years and five months?
12. How many months in one year and four months? One year and eight months? One year and ten months?
13. How many months are there from June until the end of the year?
14. How many months are there from February until the end of the year?
15. If a boy spends four cents a day, how many cents will he spend in a week?
16. What will a daily newspaper cost for a week at three cents a day?
17. If a man earns three dollars a day, Sunday excepted, how much will he earn in a week?

ARITHMETIC *

18. How many hours from 8 o'clock to 12 o'clock?

19. How many hours from 10 o'clock in the morning until noon? How many hours from noon until 3 o'clock in the afternoon?

20. How many hours from noon until 11 o'clock at night?

How many hours are from noon until midnight?

21. How many hours from 10 o'clock A.M. to 1 o'clock P.M.? (Time from midnight to noon is A.M.; time from noon to midnight is P.M.)

22. School begins at 9 o'clock A.M. and closes at 2 o'clock P.M. How long is the daily session?

23. If school opens at 9 o'clock A.M. and closes at 3 o'clock P.M., how long is the daily session?

24. How many hours in a day and night?

25. How many hours from 6 o'clock A.M. to 6 o'clock P.M.?

26. The sun rises at 7 A.M. and sets at 5 P.M. How many hours from sunrise to sunset?

27. If the sun rises at 5 A.M. and sets at 7 P.M., how many hours from sunrise to sunset?

28. How many hours from 11 A.M. to 7 P.M.?

29. How many hours from 6 A.M. to 2 P.M.?

30. A family eats breakfast at 7 o'clock A.M. and dinner 6 hours later. What is the family's dinner hour?

INTRODUCTION

Count the O's in each of the following groups

0 20 30 40 50 60

EXERCISE 37 (Written)

Twenty is equal to twice ten, or we may say, twenty equals two tens.

Thirty is equal to three times ten, or ~~three tens~~.
Thirty is written 30.

Thirty-one, three tens and one, is written 31.

There are 31 marks in this group:

A 4x10 grid of circles. The first three rows are complete, each containing 10 circles. The fourth row contains 9 circles, with the last circle missing.

Thirty-two, three tens and two, is written 32.

Thirty-three, three tens and three, is written 33.

Thirty-four, three tens and four, is written 34.

Thirty-five, three tens and five, is written 35.

Thirty-nine, three tens and nine, is written 39.

Forty means four tens, and is written 40.

Forty-one, four tens and one, is written 41.

Forty-nine means four tens and nine, and is written 49.

Fifty means five tens, and is written 50.

Fifty-nine means five tens and nine, and is written 59.

Sixty means six tens, and is written 60.

Seventy means seven tens, and is written 70.

Eighty means eight tens, and is written 80.

Ninety means nine tens, and is written 90.

Ninety-nine means nine tens and nine, and is written 99.

One hundred is ten tens, and is written 100.

1. Write in figures :

Thirty-seven, thirty-eight, forty-four, forty-seven, forty-three, fifty-two, fifty-five, fifty-nine, fifty-six, fifty-four.

2. Write in figures :

Sixty-one, sixty-three, sixty-six, sixty-eight, seventy-one, seventy-three, seventy-five, seventy-seven, seventy-nine, eighty-one, eighty-four, eighty-six, eighty-eight, eighty-nine, ninety-one, ninety-three, ninety-five, ninety-seven, ninety-six, forty-two, fifty-eight, sixty-two, ninety-eight, ninety-two.

3. How many 10's make 30? How many 10's make 50? How many 10's make 60?

4. How many 10's make 70? How many 10's make 80?
5. How many 10's make 90? How many 10's make 40?
6. How many 10's make 20? How many 10's make 100?
7. How many times is 10 contained in 44? How many are left over?
8. How many times is 10 contained in 73? How many are left over?
9. How many times is 10 contained in 92? How many are left over?
10. A boy has 75 cents consisting of a nickel and a number of dimes. How many dimes has he?
11. Tom has 95 cents in dimes and nickels. He has one nickle. How many dimes has he?
12. Alonzo has 25 cents in nickles. How many nickels has he?

- 13.** How many are :

$$\begin{array}{cccc} 28 + 2 = ? & 27 + 3 = ? & 26 + 4 = ? & 25 + 5 = ? \\ 23 + 7 = ? & 22 + 8 = ? & 21 + 9 = ? & 24 + 6 = ? \end{array}$$

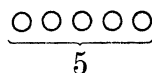
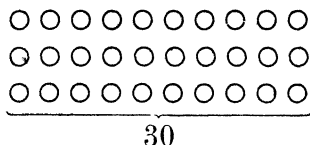
EXERCISE 38 (Oral and Written)

Add 28 and 7:

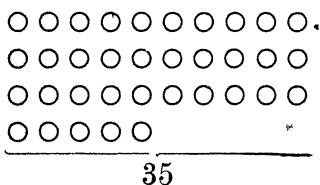
28

$\underbrace{\circ \circ \circ \circ \circ \circ \circ}_7$

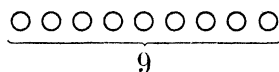
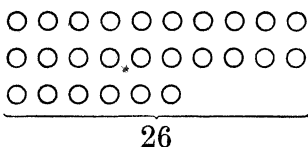
28 is 2 tens and 8. To make 3 tens we need 2 more. Take 2 from 7; leaving 5. Add this 2 to 28 and we have 3 tens, or 30, + 5 left over.



So we get 35, as the sum of 28 and 7, thus:

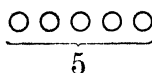
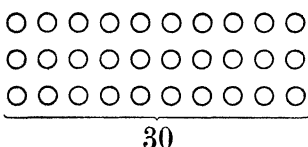


Add 26 and 9.



$$26 + 9 = 35.$$

26 is 2 tens plus 6. To make 3 tens we need 4 more. Take 4 from 9, leaving 5. Add this 4 to 26, and we have 3 tens, + 5 left over, making 35 as the sum.



Solve these examples, also, by completing the tens.

1. How many desks are :

29 desks and 1 desk ? 29 desks and 2 desks ? 29 desks and 3 desks ? 29 desks and 4 desks ? 29 desks and 5 desks ? 29 desks and 6 desks ? 29 desks and 7 desks ? 29 desks and 8 desks ? 29 desks and 9 desks ? 29 desks and 10 desks ?

2. How many pencils are :

28 pencils and 2 pencils ? 28 pencils and 3 pencils ? 28 pencils and 4 pencils ? 28 pencils and 5 pencils ? 28 pencils and 6 pencils ? 28 pencils and 7 pencils ? 28 pencils and 8 pencils ? 28 pencils and 9 pencils ? 28 pencils and 10 pencils ?

3. How many dollars are :

\$27 and \$3 ? \$27 and \$4 ? \$27 and \$5 ? \$27 and \$6 ? \$27 and \$7 ? \$27 and \$8 ? \$27 and \$9 ? \$27 and \$10 ?

4. How many cents are :

26¢ and 4¢ ? 26¢ and 5¢ 26¢ and 6¢ ? 26¢ and 7¢ ? 26¢ and 8¢ ? 26¢ and 9¢ ? 26¢ and 10¢ ?

5. How many ducks are :

25 ducks and 5 ducks ? 25 ducks and 6 ducks ? 25 ducks and 7 ducks ? 25 ducks and 8 ducks ? 25 ducks and 9 ducks ? 25 ducks and 10 ducks ?

6. How many roses are :

24 roses and 6 roses ? 24 roses and 7 roses ?

24 roses and 8 roses? 24 roses and 9 roses? 24 roses and 10 roses?

7. How many chickens are:

23 chickens and 7 chickens? 23 chickens and 8 chickens? 23 chickens and 9 chickens? 23 chickens and 10 chickens?

8. How many sheep are:

22 sheep and 8 sheep? 22 sheep and 9 sheep? 22 sheep and 10 sheep?

9. How many crows are:

21 crows and 9 crows? 21 crows and 10 crows?

10. How many are:

26 and 7? 26 and 9? 27 and 7? 27 and 9? 27 and 5? 27 and 4? 29 and 5? 29 and 8? 29 and 9?

11. How many are:

29 and 6? 29 and 4? 26 and 7? 26 and 5? 26 and 8? 26 and 9? 26 and 6? 26 and 4? 25 and 7? 25 and 9? 25 and 10? 25 and 8? 25 and 6? 25 and 5? 24 and 7? 24 and 9? 24 and 10? 24 and 8? 24 and 6? 23 and 7? 23 and 9? 23 and 10? 23 and 8? 23 and 6?

12. How many are:

22 and 9? 22 and 8? 22 and 10? 28 and 3? 28 and 5? 28 and 7? 28 and 9? 28 and 10? 28 and 6? 28 and 8?

13. How many are:

28 and 4? 28 and 2? 29 and 2? 29 and 7?

29 and 3? 29 and 10? 28 and 10? 27 and 10?
 24 and 10? 26 and 10?

Add:

6	3	9	9	2	4	4	9	7	8	7
7	2	8	8	7	3	7	6	5	6	6
8	3	9	2	8	9	3	3	8	6	8
5	4	1	9	9	8	7	8	3	9	7
<u>9</u>	<u>5</u>	<u>6</u>	<u>8</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>9</u>	<u>9</u>	<u>8</u>	<u>6</u>
9	2	7	3	8	9	4	7	5	6	9
3	4	5	6	7	8	9	0	8	7	6
9	0	9	4	0	8	7	9	6	8	3
6	9	4	7	9	5	8	8	7	7	6
9	8	7	6	5	8	7	7	6	5	8

EXERCISE 39 (Oral)

1. A farmer had 34 sheep and sold 6. How many sheep did he then have?

2. A man had \$35 and bought 2 pairs of shoes at \$4 a pair. How much money had he after buying the shoes?

3. If a schoolroom contains 36 desks and 8 are taken out, how many desks remain?

4. There are 34 pupils on the roll in a certain room, but 7 pupils are absent to-day. How many pupils are in school to-day?

5. There are 35 books on a shelf and 9 books are taken off. How many remain on the shelf?

6. There are 36 eggs in a basket. If I take out 8, how many eggs will remain in the basket?

7. A farmer has 32 cattle in a certain pasture. If he takes out 7, how many cattle will remain in the pasture?

8. A man has 3 ten-dollar bills and 3 one-dollar bills. How much money will he have after paying for a suit of clothes that costs \$9?

9. Henry has 7 nickels and 2 cents. How much money will Henry have after paying for a copy book which costs 9 cents?

10. John has 3 dimes and 1 one-cent piece. After buying two oranges for 7¢, how much money will he have?

11. A board is 34 inches long. After cutting off 9 in., how many inches long will the remaining board be?

12. A farmer has 36 bushels of wheat. He sells 9 bu. How many bushels of wheat has the farmer left?

13. A field contains 36 acres. It is planted in corn and potatoes. If there are 9 acres in potatoes, how many acres are in corn?

EXERCISE 40 (Written)

Copy and complete :

$14 - 5 =$

$15 - 8 =$

$17 - 8 =$

$24 - 5 =$

$25 - 8 =$

$28 - 8 =$

$34 - 5 =$

$35 - 8 =$

$37 - 8 =$

$26 - 8 =$	$21 - 7 =$	$28 - 0 =$
$36 - 8 =$	$31 - 7 =$	$38 - 9 =$
$13 - 9 =$	$12 - 5 =$	$14 - 6 =$
$23 - 9 =$	$22 - 5 =$	$24 - 6 =$
$33 - 9 =$	$32 - 5 =$	$34 - 6 =$
$12 - 8 =$	$14 - 7 =$	$13 - 8 =$
$22 - 8 =$	$24 - 7 =$	$23 - 8 =$
$32 - 8 =$	$34 - 7 =$	$33 - 8 =$
$17 - 9 =$	$16 - 9 =$	$13 - 7 =$
$27 - 9 =$	$26 - 9 =$	$23 - 7 =$
$37 - 9 =$	$36 - 9 =$	$33 - 7 =$

Subtract :

$\begin{array}{r} 31 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 37 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 34 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 38 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 39 \\ 9 \\ \hline \end{array}$
$\begin{array}{r} 33 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 37 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 34 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 7 \\ \hline \end{array}$
$\begin{array}{r} 17 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ 10 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ 9 \\ \hline \end{array}$
$\begin{array}{r} 18 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 37 \\ 10 \\ \hline \end{array}$	$\begin{array}{r} 34 \\ 6 \\ \hline \end{array}$

EXERCISE 41 (Written)

Add :

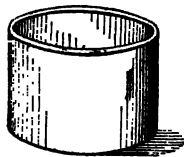
$\begin{array}{r} 6 \\ 3 \\ 8 \\ 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 5 \\ 8 \\ 8 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 7 \\ 8 \\ 9 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 6 \\ 7 \\ 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 9 \\ 0 \\ 9 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 4 \\ 6 \\ 5 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 9 \\ 5 \\ 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 7 \\ 4 \\ 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 6 \\ 9 \\ 6 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 5 \\ 4 \\ 8 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 2 \\ 5 \\ 4 \\ 7 \\ \hline \end{array}$
--	--	--	--	--	--	--	--	--	--	--

5	6	7	8	9	4	8	2	3	6	5
8	5	6	4	0	8	8	9	9	5	9
6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	5	5	5	5	4	4
6	8	4	8	9	7	7	9	8	9	7
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Copy and complete :

$8+8+8+8=$	$9+9+9+9=$	$7+7+7+9=$
$8+8+8+9=$	$9+9+9+6=$	$5+9+9+5=$
$6+9+9+8=$	$9+6+8+9=$	$7+7+7+7=$
$8+8+7+7=$	$9+9+6+6=$	$7+9+7+9=$
$6+9+9+8=$	$9+9+7+7=$	$8+8+8+7=$
$9+8+9+8=$	$5+7+7+9=$	$7+6+7+9=$
$9+6+7+7=$	$8+8+9+9=$	$8+5+9+8=$
$3+9+8+6=$	$4+9+9+7=$	$5+8+9+8=$
$5+9+7+6=$	$7+5+9+4=$	$8+9+3+9=$
$9+9+2+8=$	$5+9+7+8=$	$4+9+9+9=$
$3+8+9+9=$	$9+4+9+8=$	$6+8+9+7=$

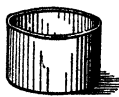
EXERCISE 42 (Oral)



BUSHEL



HALE-BUSHEL



PECK



QUART



PINT

2 pints (pt.) = 1 quart (qt.)

8 quarts = 1 peck (pk.)

4 pecks = 1 bushel (bu.)

1. How many pecks in 2 bu.? How many pecks in 3 bu.? How many pecks in 4 bu.? How many pecks in 5 bu.? How many pecks in 6 bu.?

2. How many pecks in $\frac{1}{2}$ bu.? How many pecks in $\frac{1}{4}$ bu.? How many quarts in 1 pk.? How many quarts in 2 pk.? How many quarts in 3 pk.? How many quarts in 4 pk.? How many quarts in $\frac{1}{2}$ pk.? How many quarts in a peck and $\frac{1}{2}$ pk.?

3. A boy bought 1 pk. and 2 qt. of pecans. How many quarts did he buy?

4. A boy bought 2 pk. and 3 qt. of pecans. How many quarts did he buy?

5. How many pints in 1 qt.? How many pints in 2 qt.? How many pints in 4 qt.? How many pints in $\frac{1}{2}$ pk.? How many pints in 8 qt.? In 12 qt.?

6. How many pints in 1 pk.? How many pints in 1 qt. and 1 pt.?

7. How many pints in 1 qt. and $\frac{1}{2}$ qt.? How many pints in 2 qt. and $\frac{1}{2}$ qt.? How many $\frac{1}{2}$ bu. in 1 bu.? How many $\frac{1}{2}$ bu. in 1 bu. and $\frac{1}{2}$ bu.?

8. How many quarts of apples will it take to fill a half bushel measure?

9. How many pints of peanuts will fill a half bushel measure?

10. Three quarts of oats have been taken out of a sack containing half a bushel. How many quarts are left?

11. Two pecks of corn are taken out of a sack containing 2 bu. How many pecks remain in the sack?

12. A can contains 16 qt. of pecans. Five quarts are sold. How many remain in the can?

13. A fruit vender has 12 qt. of peanuts. If he sells 6 pt., how many quarts has he left?

14. How many pecks in 16 qt.?

15. How many quarts in 20 pt.?

16. How many pecks in 24 qt.?

17. Strawberries sell for 5¢ a quart. At this rate, how much will a peck of strawberries sell for?

18. When cherries cost 8¢ a quart, what will 4 qt. cost?

19. How many sacks, each containing 1 bu., will be required to hold 16 pk.?

20. How many sacks of wheat, each containing 2 bu., will be required to fill a bin holding 28 bu.?

21. A quart of pecans costs 6¢. Find the cost of half a peck.

22. Find the cost of 1 bu. of potatoes, if 1 pk. costs 25¢.

23. How many pints are 2 qt. and 1 pt.?

24. How many pints in 9 qt. and 1 pt.?

25. How many quarts in 2 pk. and 3 qt.?

EXERCISE 43 (Oral)

How many are :

Three 2's and 1?	Four 8's and 2?	Seven 1's and 5?
Three 4's and 2?	Four 9's and 2?	Seven 2's and 1?
Three 5's and 1?	Five 1's and 3?	Seven 2's and 3?
Three 6's and 2?	Five 2's and 2?	Seven 2's and 6?
Three 7's and 1?	Five 3's and 2?	Seven 3's and 1?
Three 8's and 1?	Five 3's and 4?	Seven 3's and 4?
Three 9's and 2?	Five 4's and 3?	Seven 3's and 6?
Four 1's and 3?	Five 5's and 2?	Seven 4's and 1?
Four 2's and 3?	Five 5's and 4?	Seven 4's and 3?
Four 3's and 2?	Five 6's and 1?	Seven 4's and 5?
Four 4's and 3?	Five 6's and 4?	Seven 4's and 6?
Four 5's and 1?	Five 7's and 1?	Seven 5's and 1?
Four 6's and 3?	Five 7's and 3?	Seven 5's and 3?
Four 7's and 2?	Seven 1's and 3?	Seven 5's and 2?

1. How many 4's in 11? *Ans.* There are two 4's and 3 over.

2. How many 2's in 13? 15? 17? 19?

3. How many 3's in 5? 8? 10? 13? 16? 19? 23? 25? 28? 29?

4. How many 4's in 7? 9? 10? 13? 15? 17? 19? 21? 23? 26? 27? 29? 30? 31? 33? 35? 37?

5. How many 5's in 7? 9? 11? 12? 14? 16? 18? 19? 21? 23? 24? 26? 28? 29? 31? 33? 37? 38? 39?

6. How many 6's in 8? 11? 13? 15? 17? 16? 19? 20? 22? 23? 25? 27? 28? 31? 29? 33? 35?

7. How many 7's in 10? 12? 13? 15? 17? 19?
16? 18? 20? 23? 25? 24? 26? 27? 29? 30? 31?
33? 34? 36? 38? 39?

8. How many 8's in 11? 13? 15? 18? 19? 21?
23? 20? 25? 26? 27? 29?

EXERCISE 44 (Written and Oral)

Copy and complete:

$6 \times 4 =$	$3 \times 9 =$	$16 \div 4 =$	$35 \div 5 =$	$28 \div 7 =$
$7 \times 3 =$	$4 \times 8 =$	$24 \div 4 =$	$40 \div 5 =$	$35 \div 7 =$
$8 \times 2 =$	$4 \times 9 =$	$28 \div 4 =$	$15 \div 5 =$	$8 \div 8 =$
$9 \times 1 =$	$9 \times 3 =$	$32 \div 4 =$	$25 \div 5 =$	$16 \div 8 =$
$6 \times 5 =$	$8 \times 4 =$	$36 \div 4 =$	$5 \div 5 =$	$32 \div 8 =$
$7 \times 4 =$	$5 \times 4 =$	$12 \div 3 =$	$6 \div 6 =$	$24 \div 8 =$
$8 \times 3 =$	$5 \times 5 =$	$15 \div 3 =$	$12 \div 6 =$	$40 \div 8 =$
$9 \times 2 =$	$6 \times 6 =$	$21 \div 3 =$	$24 \div 6 =$	$9 \div 9 =$
$7 \times 5 =$	$9 \times 4 =$	$18 \div 3 =$	$36 \div 6 =$	$18 \div 9 =$
$5 \times 7 =$	$4 \times 4 =$	$24 \div 3 =$	$30 \div 6 =$	$36 \div 9 =$
$5 \times 6 =$	$3 \times 3 =$	$27 \div 3 =$	$18 \div 6 =$	$27 \div 9 =$
$4 \times 7 =$	$3 \times 7 =$	$10 \div 5 =$	$7 \div 7 =$	$12 \div 4 =$
$3 \times 8 =$	$2 \times 10 =$	$20 \div 5 =$	$21 \div 7 =$	$8 \div 4 =$
$2 \times 9 =$	$10 \times 2 =$	$30 \div 5 =$	$14 \div 7 =$	$4 \div 4 =$

12 inches (in.) = 1 foot (ft.)

3 feet = 1 yard (yd.)

1. How many inches in 1 ft.? How many inches in 2 ft. How many in 3 ft.? How many inches in 1 yd.?

2. How many inches in $\frac{1}{2}$ ft.? How many inches in $\frac{1}{3}$ ft.? How many inches in $\frac{1}{4}$ ft.?

3. How many times are 6 in. contained in 1 yd.? How many times are 4 in. contained in 1 yd.? How many times are 9 in. contained in 1 yd.?

4. How many times is 1 ft. contained in 1 yd.? How many times are 12 in. contained in 1 yd.?

5. How many inches in one and one half feet?

6. How many inches in a rule 1 ft., 3 in. long?

7. How many inches in 1 ft. 8 in.? In 1 ft. and $\frac{1}{3}$ of a ft.? In 1 ft. and $\frac{1}{4}$ of a ft.?

8. How many inches in a foot and a half?

NOTE. The class should be provided with a yardstick.

Copy and complete:

$\frac{1}{2}$ of 12 inches =	$\frac{1}{4}$ of 16 inches =
$\frac{1}{3}$ of 12 inches =	$\frac{1}{4}$ of 28 inches =
$\frac{1}{4}$ of 12 inches =	$\frac{1}{4}$ of 36 inches =
$\frac{1}{2}$ of 20 inches =	$\frac{1}{3}$ of 27 inches =
$\frac{1}{2}$ of 18 inches =	$\frac{1}{3}$ of 9 inches =
$\frac{1}{3}$ of 18 inches =	$\frac{1}{3}$ of 15 inches =
$\frac{1}{2}$ of 24 inches =	$\frac{1}{2}$ of 14 inches =
$\frac{1}{3}$ of 24 inches =	$\frac{1}{2}$ of 10 inches =
$\frac{1}{4}$ of 24 inches =	$\frac{1}{3}$ of 33 inches =
$\frac{1}{4}$ of 20 inches =	$\frac{1}{4}$ of 32 inches =

EXERCISE 45 (Oral)

1. How many are:

39 and 1? 39 and 2? 39 and 3? 39 and 4?

39 and 5? 39 and 6? 39 and 7? 39 and 8?

39 and 9? 39 and 10?

2. How many are ?

38 and 2? 38 and 3? 38 and 4? 38 and 5?
38 and 6? 38 and 7? 38 and 8? 38 and 9?

3. How many are :

37 and 3? 37 and 4? 37 and 5? 37 and 6?
37 and 7? 37 and 8? 37 and 9? 37 and 10?

4. How many are :

36 and 4? 36 and 5? 36 and 6? 36 and 7?
36 and 8? 36 and 9? 36 and 10?

5. How many are :

35 and 5? 35 and 6? 35 and 7? 35 and 8?
35 and 9? 35 and 10?

6. How many are :

34 and 6? 34 and 7? 34 and 8? 34 and 9?

7. How many are :

33 and 7? 33 and 8? 33 and 9? 33 and 10?

8. How many are :

32 and 8? 32 and 9? 32 and 10?

9. How many are :

31 and 9? 31 and 10?

10. How many are :

33 and 9? 35 and 9? 36 and 9? 31 and 8?
32 and 8? 36 and 7? 35 and 8? 35 and 7?
39 and 6? 38 and 8? 34 and 8? etc.

NOTE TO TEACHERS. Treat the numbers from 40 to 50, 50 to 60, 60 to 70, 70 to 80, 80 to 90, and 90 to 100 as has been done with numbers between 20 and 30 and 30 and 40.

EXERCISE 46 (Oral)

16 ounces (oz.) = 1 pound (lb.)

1. How many ounces in one half of a pound?
2. How many ounces in $\frac{1}{4}$ lb.?
3. What part of 1 lb. is 8 oz.?
4. What part of 1 lb. is 4 oz.?
5. How much will 8 oz. of butter cost at 20¢ a pound?
6. What will 5 lb. of rice cost at 6¢ a pound?
7. What will 6 lb. of sugar cost at 5¢ a pound?
8. Find the cost of 4 lb. nails at 7¢ a pound.
9. What will $\frac{1}{2}$ lb. of coffee cost at 30¢ a pound?
10. What will $\frac{1}{2}$ lb. of tea cost at 50¢ a pound?
11. What will $\frac{1}{2}$ lb. of butter cost at 26¢ a pound?
12. What will $\frac{1}{2}$ bu. of oats weigh, if 1 bu. weighs 32 lb.?
13. A bushel of wheat weighs 60 lb. What will $\frac{1}{2}$ bu. weigh?
14. How many 2-oz. packages can you make out of 1 lb.?
15. How many 4-oz. packages can you make out of 1 lb. of butter?
16. How many 8-oz. packages can be made out of 2 lb. of cheese?
17. Find the cost of $\frac{1}{2}$ lb. of seed at 2¢ an oz.

EXERCISE 47 (Oral)

100 cents (ϕ) = 1 dollar (\$).

1. How many cents equal one dime?
2. How many cents equal one nickel?
3. How many nickels equal one dime?
4. How many cents are equal in value to $\frac{1}{2}$ of a dollar?
5. How many dimes are equal in value to $\frac{1}{2}$ of a dollar?
6. How many cents are equal in value to one fourth of a dollar?
7. How many quarters are equal to a half dollar?
8. How many nickels are equal to a quarter of a dollar?
9. Name three coins together equal to a quarter.
10. Name two coins together equal to 15 ϕ .
11. Name two coins together equal to one half dollar.
12. How can you make 35 ϕ in change with two coins?
13. How can you make 40 ϕ in change with three coins?
14. How can you make 75 ϕ in change with two coins?
15. How much car fare will a boy pay in one week to and from school, fare five cents?

EXERCISE 48 (Oral)

How many are :

1. 2 and 9 ? 2 and 19 ? 2 and 29 ? 2 and 39 ?
 2 and 49 ? 2 and 59 ? 2 and 69 ? 2 and 79 ?
 2 and 89 ? 2 and 99 ?
2. 3 and 9 ? 3 and 19 ? 3 and 29 ? 3 and 39 ?
 3 and 49 ? 3 and 59 ? 3 and 69 ? 3 and 79 ?
 3 and 89 ? 3 and 99 ?
3. 4 and 9 ? 4 and 19 ? 4 and 29 ? 4 and 39 ?
 4 and 49 ? 4 and 59 ? 4 and 69 ? 4 and 79 ?
 4 and 89 ? 4 and 99 ?
4. 5 and 9 ? 5 and 19 ? 5 and 29 ? 5 and 39 ?
 5 and 49 ? 5 and 59 ? 5 and 69 ? 5 and 79 ?
5. 6 and 9 ? 6 and 19 ? 6 and 29 ? 6 and 39 ?
 6 and 49 ? 6 and 59 ? 6 and 69 ? 6 and 79 ?
 6 and 89 ? 6 and 99 ?
6. 7 and 9 ? 7 and 19 ? 7 and 29 ? 7 and 39 ?
 7 and 49 ? 7 and 59 ? 7 and 69 ? 7 and 79 ?
 7 and 89 ? 7 and 99 ?
7. 8 and 9 ? 8 and 19 ? 8 and 29 ? 8 and 39 ?
 8 and 49 ? 8 and 59 ? 8 and 69 ? 8 and 79 ?
8. 9 and 9 ? 9 and 19 ? 9 and 29 ? 9 and 39 ?
 9 and 49 ? 9 and 59 ? 9 and 69 ? 9 and 79 ?
 9 and 89 ? 9 and 99 ?
9. 2 and 8 ? 2 and 18 ? 2 and 28 ? 2 and 38 ?
 2 and 48 ? 2 and 58 ? 2 and 68 ? 2 and 78 ?
 2 and 88 ? 2 and 98 ?

10. 3 and 8? 3 and 18? 3 and 28? 3 and 38?
 3 and 48? 3 and 58? 3 and 68? 3 and 78?
 3 and 88? 3 and 98?
11. 4 and 8? 4 and 18? 4 and 28? 4 and 38?
 4 and 48? 4 and 58? 4 and 68? 4 and 78?
 4 and 88? 4 and 98?
12. 5 and 8? 5 and 18? 5 and 28? 5 and 38?
 5 and 48? 5 and 58? 5 and 68? 5 and 78?
 5 and 88? 5 and 98?
13. 6 and 8? 6 and 18? 6 and 28? 6 and 38?
 6 and 48? 6 and 58? 6 and 68? 6 and 78?
 6 and 88? 6 and 98?
14. 7 and 8? 7 and 18? 7 and 28? 7 and 38?
 7 and 48? 7 and 58? 7 and 68? 7 and 78?
 7 and 88? 7 and 98?
15. 8 and 8? 8 and 18? 8 and 28? 8 and 38?
 8 and 48? 8 and 58? 8 and 68? 8 and 78?
 8 and 88? 8 and 98?
16. 9 and 8? 9 and 18? 9 and 28? 9 and 38?
 9 and 48? 9 and 58? 9 and 68? 9 and 78?
17. 6 and 6? 6 and 16? 6 and 36? 6 and 76?
 7 and 7? 7 and 17? 7 and 37? 7 and 87?
 8 and 7? 8 and 17? 8 and 47? 8 and 68?
 9 and 4? 9 and 24? 9 and 54? 9 and 74?
 9 and 7? 9 and 17? 9 and 37? 9 and 67?
 7 and 3? 7 and 13? 7 and 43? 7 and 93?
 7 and 5? 7 and 25? 7 and 55? 7 and 75?
 6 and 5? 6 and 35? 6 and 65? 6 and 85?

EXERCISE 49 (Oral)

1. Take 4 from 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.
2. Take 6 from 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.
3. Take 8 from 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.
4. Take 9 from 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.
5. Take 5 from 11, 21, 31, 41, 51, 61, 71, 81, 91, 101.
6. Take 7 from 11, 21, 31, 41, 51, 61, 71, 81, 91, 101.
7. Take 9 from 11, 21, 31, 41, 51, 61, 71, 81, 91, 101.
8. Take 2 from 12, 22, 32, 42, 52, 62, 72, 82, 92, 102.
9. Take 5 from 12, 22, 32, 42, 52, 62, 72, 82, 92, 102.
10. Take 7 from 12, 22, 32, 42, 52, 62, 72, 82, 92, 102.
11. Take 8 from 12, 22, 32, 42, 52, 62, 72, 82, 92, 102.
12. Take 4 from 13, 23, 33, 43, 53, 63, 73, 83, 93, 103.
13. Take 5 from 13, 23, 33, 43, 53, 63, 73, 83, 93, 103.
14. Take 6 from 13, 23, 33, 43, 53, 63, 73, 83, 93, 103.
15. Take 7 from 13, 23, 33, 43, 53, 63, 73, 83, 93, 103.
16. Take 8 from 13, 23, 33, 43, 53, 63, 73, 83, 93, 103.
17. Take 9 from 13, 23, 33, 43, 53, 63, 73, 83, 93, 103.
18. Take 5 from 14, 24, 34, 44, 54, 64, 74, 84, 94, 104.
19. Take 6 from 14, 24, 34, 44, 54, 64, 74, 84, 94, 104.
20. Take 7 from 14, 24, 34, 44, 54, 64, 74, 84, 94, 104.
21. Take 8 from 14, 24, 34, 44, 54, 64, 74, 84, 94, 104.
22. Take 9 from 14, 24, 34, 44, 54, 64, 74, 84, 94, 104.
23. Take 6 from 15, 25, 35, 45, 55, 65, 75, 85, 95, 105.
24. Take 7 from 15, 25, 35, 45, 55, 65, 75, 85, 95, 105.

MULTIPLICATION TABLE

2	3	4	5
TIMES	TIMES	TIMES	TIMES
1 are 2	1 are 3	1 are 4	1 are 5
2 are 4	2 are 6	2 are 8	2 are 10
3 are 6	3 are 9	3 are 12	3 are 15
4 are 8	4 are 12	4 are 16	4 are 20
5 are 10	5 are 15	5 are 20	5 are 25
6 are 12	6 are 18	6 are 24	6 are 30
7 are 14	7 are 21	7 are 28	7 are 35
8 are 16	8 are 24	8 are 32	8 are 40
9 are 18	9 are 27	9 are 36	9 are 45
6	7	8	9
TIMES	TIMES	TIMES	TIMES
1 are 6	1 are 7	1 are 8	1 are 9
2 are 12	2 are 14	2 are 16	2 are 18
3 are 18	3 are 21	3 are 24	3 are 27
4 are 24	4 are 28	4 are 32	4 are 36
5 are 30	5 are 35	5 are 40	5 are 45
6 are 36	6 are 42	6 are 48	6 are 54
7 are 42	7 are 49	7 are 56	7 are 63
8 are 48	8 are 56	8 are 64	8 are 72
9 are 54	9 are 63	9 are 72	9 are 81

EXERCISE 50 (Oral and Written)

1. Count by 2's to 100, beginning with 2. Beginning with 1.

2. Count by 3's to 100, beginning with 3. Beginning with 1. Beginning with 2.

3. Count by 4's to 100, beginning with 4. Beginning with 1. Beginning with 2. Beginning with 3.

4. Count by 5's to 100, beginning with 5. Beginning with 1. Beginning with 2. Beginning with 3. Beginning with 4.

5. Count by 6's to 100, beginning with 6. Beginning with 1. Beginning with 2. Beginning with 3. Beginning with 4. Beginning with 5.

6. Count by 7's to 100, beginning with 7. Beginning with 1. Beginning with 2. Beginning with 3. Beginning with 4. Beginning with 5. Beginning with 6.

7. Count by 8's to 100, beginning with 8. Beginning with 1. Beginning with 2. Beginning with 3. Beginning with 4. Beginning with 5. Beginning with 6. Beginning with 7.

8. Count by 9's to 100, beginning with 9. Beginning with 1. Beginning with 2. Beginning with 3. Beginning with 4. Beginning with 5. Beginning with 6. Beginning with 7. Beginning with 8.

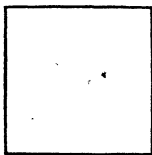
9. Count by 10's to 100, beginning with 10. Beginning with 1. Beginning with 2. Beginning with

3. Beginning with 4. Beginning with 5. Beginning with 6. Beginning with 7. Beginning with 8. Beginning with 9.

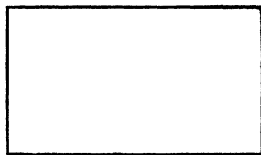
NOTE TO TEACHER. This is one of the most important exercises in primary work in arithmetic. Pupils should be drilled in counting as above indicated until they have mastered it.



TRIANGLE



SQUARE



RECTANGLE

A **triangle** is a flat surface bounded by three straight lines.

The corners of a triangle are called **angles**.

An angle that is shaped like the corners of this page is called a **right angle**.

A **rectangle** is a flat surface bounded by four straight lines and having four corners which are all right angles.

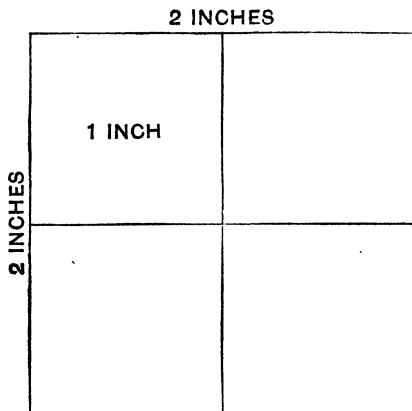
A **square** is a rectangle which has all four sides equal.

A **square foot** is a square with sides each one foot long.

A **square inch** is a square with sides each one inch long.

Draw a square having each side two inches long. Divide it into square inches. How many square inches does it contain?

By counting the small squares in this large square we find that there are 4; that is, a square having each side 2 inches long contains 4 square inches.



We could have got the same result by multiplying the length of the square by the width. Thus:

$$2 \times 2 \text{ inches} = 4 \text{ inches.}$$

Since the length and width of a square are the same, this is the same as multiplying the length of one side by itself.

A square 2 inches on a side is called a **two-inch square**.

Draw a 3-inch square. How many square inches does it contain?

We multiply one side of the square by itself.

Thus: $3 \times 3 = 9.$

Hence a three-inch square contains nine square inches.

RULE: To find the number of square inches in a square: **multiply the number of inches in one side by itself.**

Draw a 4-inch square. Divide it into square inches. How many square inches does it contain?

Draw a five-inch square. Divide it into square inches. How many square inches does it contain?

Draw a rectangle three inches on one side and two inches on one side. How many inches on each of the other two sides? Divide the rectangle into square inches. How many square inches does it contain?

We call this a *rectangle 2 inches by 3 inches*.

To find the number of square inches in a rectangle: **multiply the number of inches in the length of the rectangle by the number of inches in its width.**

Draw a rectangle four inches by three inches. Divide it into square inches. How many square inches does it contain?

Draw a rectangle five inches by three inches. Divide it into square inches. How many square inches does it contain?

Draw a rectangle four inches by five inches. Divide it into square inches. How many square inches does it contain?

A rectangle is six inches by three inches. Find the length of its four sides.

A rectangle is seven inches by five inches. Find the length of its four sides.

A rectangle is eight inches by four inches. Find the length of its four sides.

A rectangle is nine inches by eight inches. Find the length of its four sides.

A square is seven feet on each side. How many square feet in its surface? How many feet in the length of its four sides?

To find the number of square feet in a square: **multiply the number of feet in one side by itself.**

To find the number of square feet in a rectangle: **multiply the number of feet in the length of the rectangle by the number of feet in its width.**

How many square inches in a square one of whose sides is four inches long?

How many square inches in a square one of whose sides is five inches long?

How many square inches in a square one of whose sides is nine inches long?

To find the number of square yards in a square: **multiply the number of yards in the length of one side by itself.**

To find the number of square yards in a rectangle: **multiply the number of yards in the length of the rectangle by the number of yards in its width.**

PART II

NUMERATION AND NOTATION

EXERCISE 1 (Oral and Written)

Numeration means *counting* or *reading* numbers.

Notation means writing *numbers*.

NUMERATION

Count 100 by tens.

In counting, after we reach one hundred, we begin to count another hundred, adding it to the first hundred as we count. Thus, the next number after one hundred is one hundred one, then one hundred two, one hundred three, one hundred four, one hundred five, and so on, up to one hundred ninety-nine. The next number after one hundred ninety-nine is two hundred. After we count up to two hundred, we can go on counting the third hundred, and adding it to the first two hundred. Thus, two hundred one, two hundred two, and so on to two hundred ninety-nine. The next number after two hundred ninety-nine is three hundred. After counting three hundred, we can go on counting the fourth hundred, adding it to the third hundred as we count. Thus, three hundred one, and so on to four hundred.

From four hundred we count to five hundred.

From five hundred we count to six hundred.

From six hundred we count to seven hundred.

From seven hundred we count to eight hundred.

From eight hundred we count to nine hundred.

From nine hundred we count to ten hundred.

Ten hundred is called **one thousand**.

After we reach one thousand, we can go on counting the next hundred and adding it to the thousand, thus: one thousand one, one thousand two, one thousand three, and so on up to one thousand one hundred, which is the same as eleven hundred.

From one thousand one hundred we go on counting. Thus, one thousand one hundred one, one thousand one hundred two, one thousand one hundred three, and so on up to one thousand two hundred.

From one thousand two hundred we count in the same way, to one thousand three hundred, then.

To one thousand four hundred,

To one thousand five hundred,

And so on, to one thousand nine hundred.

From one thousand nine hundred we count to one thousand ten hundred, or **two thousand**.

Two thousand is the same as twenty hundred.

From two thousand we go on counting, thus: two thousand one, two thousand two, two thousand three, and so on to two thousand one hundred.

Then we count on to two thousand two hundred, and so on up to two thousand ten hundred.

Two thousand ten hundred is called **three thousand**. Three thousand is the same as thirty hundreds.

From three thousand we count in the same way to four thousand, to five thousand, to six thousand, to seven thousand, and so on to one hundred thousand.

NOTATION

One hundred is written 100.

Two hundred is written 200.

Three hundred is written 300.

Four hundred is written 400.

Five hundred is written 500.

Six hundred is written 600.

Seven hundred is written 700.

Eight hundred is written 800.

Nine hundred is written 900.

One thousand is written 1000.

One hundred one is written 101.

One hundred two is written 102.

One hundred ten is written 110.

One hundred twenty is written 120.

One hundred thirty is written 130.

One hundred forty-eight is written 148.

Two hundred twenty is written 220.

Two hundred fifty is written 250.

Two hundred sixty-three is written 263.

Three hundred sixty-one is written 361.

Nine hundred ninety-nine is written 999.

One thousand one is written 1001.

One thousand two is written 1002.

One thousand ninety-nine is written 1099.

One thousand one hundred is written 1100.

One thousand one hundred one is written 1101.

One thousand one hundred two is written 1102.

One thousand one hundred ninety-nine is written 1199.

Two thousand is written 2000.

Two thousand one is written 2001.

Two thousand one hundred is written 2100.

Two thousand one hundred one is written 2101.

Two thousand nine hundred and ninety-nine is written 2999.

Three thousand is written 3000.

Nine thousand nine hundred and ninety-nine is written 9999.

Ten thousand is written 10,000.

Ten thousand one is written 10,001.

Ten thousand one hundred is written 10,100.

Ten thousand nine hundred ninety-nine is written 10,999.

Eleven thousand is written 11,000.

Twenty thousand is written 20,000.

Thirty thousand is written 30,000.

Forty thousand ten is written 40,010.

Ninety-nine thousand nine hundred nine is written 99,909.

One hundred thousand is written 100,000.

Two hundred thousand is written 200,000.

One thousand thousand is written 1,000,000.

One thousand thousand is called a **million**.

EXERCISE 2 (Oral and Written)

Read : 108, 114, 119, 123, 129, 132, 133, 144, 156, 256, 264, 274, 285, 303, 309, 306, 316, 330, 350, 360, 380, 390, 382, 372, 352, 349, 401, 404, 444, 414, 426, 434, 464, 475, 482, 499, 502, 503, 603, 803, 904, 706, 607, 666, 555, 714, 728, 773, 815, 818, 834, 836, 860, 880, 906, 919, 927, 963, 982, 999, 1000, 2000, 3000, 7000, 8000, 1001, 1009, 1010, 1040, 1090, 1097, 1100, 1200, 1300, 1600, 1800, 1122, 1111, 1174, 1108, 1504, 1609, 1711, 1770, 1880, 1938.

Write in figures :

One hundred six. One hundred fourteen. One hundred fifty. Two hundred ten. Two hundred twenty. Two hundred seventy-one. Three hundred eight. Three hundred twelve. Three hundred ninety-two. Four hundred twenty-five. Four hundred eighteen. Four hundred ninety. Four hundred eighty-five. Four hundred sixty-two. Five hundred nine. Five hundred eleven. Five hundred fifty-five. Five hundred ninety-five. Seven hundred three. Seven hundred thirteen. Seven hundred twelve. Seven hundred seventy-seven. Seven hundred fifty-one. Eight hundred one. Nine hundred two. Seven hundred five. Six hundred eight. Six hundred ten. Six hundred twenty. Seven hundred forty. Nine hundred seventy. Nine hundred seven. Seven hundred nine. Eight hundred eighty-eight. Nine hundred four. Nine hundred fourteen. Nine hundred

forty. Nine hundred twenty-three. Nine hundred ninety-two. Seven hundred sixty-eight. Seven hundred seven. One thousand two hundred thirty-one. One thousand three hundred. One thousand eight hundred. Two thousand seven hundred ninety-nine. Two thousand nine hundred. Three thousand sixteen. Four thousand two hundred eight. Five thousand eight hundred one. Six thousand three. Seven thousand eight hundred sixty-nine. Nine thousand seven hundred twenty. Ten thousand seven. Ten thousand two hundred ten. Seventeen thousand four hundred. Twenty thousand seventeen. Twenty thousand six hundred eighty-one. Twenty thousand nine hundred ninety-six. Twenty-one thousand. Twenty-nine thousand eight hundred ten. Thirty thousand two. Thirty-five thousand seven hundred eight. Forty-one thousand four hundred seventeen. Fifty thousand six hundred. Eighty-eight thousand eight hundred eight. Ninety-six thousand nine hundred ninety-nine.

EXERCISE 3 (Oral)

1. Count by 20's to 100.
2. Count by 30's to 120.
3. Count by 1,000's to 10,000.
4. Count by 10,000's from 10,000 to 100,000.
5. Count by 100's to 2,000.
6. Count by 50's to 1,000.
7. Count by 200's to 2,000.
8. Count by 300's to 2,100.

9. Count by 400's to 2,400.
10. Count by 600's to 3,000.
11. Count by 700's to 3,500.
12. Count by 800's to 4,000.
13. Count by 900's to 7,200.

NUMERATION AND NOTATION

Unit means one. Thus 7 units means 7 ones, or just **seven**. The number of tens in a number means the number of times that ten will go into the number. Thus,

$50 = 5$ tens, because 5 goes into 50, ten times.

$51 = 50 + 1$, so that we may say that $51 = 5$ tens and one unit.

Also, $51 = 51$ units.

$52 = 5$ tens and 2 units or 52 units.

We see, then, that ten, or any number larger than ten, may be expressed as tens and units, or as units. Thus,

$60 = 6$ tens and 0 units, or $60 = 60$ units.

$61 = 6$ tens and one unit.

The right hand figure of a number is called the **units' figure**. Thus, in 61 the units' figure is 1. The figure next to the units' figure, toward the left, is called the **tens' figure**. In 61 the tens' figure is 6.

$248 = 200$ plus 40 plus 8. So we may say that $248 = 2$ hundreds, 4 tens and 8 units.

The third figure counting from the right is called the **hundreds' figure**. In 248, the hundreds' figure is 2,

The fourth figure from the right is called the **thousands' figure**.

For example, 1,783 consists of four figures; the figure on the right, 3, stands for 3 ones, or 3 units, the next figure to the left, 8, stands for 8 tens, the next figure to the left, 7, stands for 7 hundreds, the figure 1, to the left of hundreds, stands for 1 thousand.

The units' figure is said to occupy the units' place in the number. The tens' figure is said to occupy the tens' place, the hundreds' figure is said to occupy the hundreds' place, and the thousands' figure is said to occupy the thousands' place.

In 5,555,555,

5 in the units' place stands for 5 ones, or 5 units ($5 = \text{five}$). 5 in the next place to the left stands for ten times as much as the 5 in the units' place ($50 = \text{fifty}$). 5 in the next place to the left, that is, the hundreds' place, stands for ten times as much as 5 in the tens' place ($500 = \text{five hundred}$). 5 in the next place to the left, that is, the thousands' place, stands for ten times as much as 5 in the hundreds' place ($5,000 = \text{five thousand}$). If we write another 5 to the left, this 5 will stand for ten times as much as the 5 in the thousands' place, or $50,000 = \text{fifty thousand}$. If we write still another 5 to the left of this last 5 ($500,000 = \text{five hundred thousand}$), its value will be ten times greater than the 5 to its immediate right, and so on.

5 , 5 5 5 , 5 5 5

This number is read five million five hundred fifty-five thousand five hundred fifty-five.

Before reading a number of more than three figures, we divide the figures of the number into periods of three figures each, beginning at the right. The first period to the right is called the units' period, the next period is called the thousands' period, and the next period is called the millions' period.

Then we read each period by itself, beginning at the left and give it its name.

Example 1. Read 17494. To read this number we divide it into periods. Doing so, we have

17,494.

This is read seventeen thousand four hundred ninety-four.

Example 2. Read 309208. Dividing as before into periods, we have

309,208.

This number is read three hundred nine thousand two hundred eight.

EXERCISE 4 (Oral and Written)

Read :

1. 4905; 7824; 6060; 5409; 3201; 4015; 5100; 6064; 6078; 6004.

2. 11493; 20608; 30209; 50068; 61072; 68091; 79003; 80005.

3. 124276; 178908; 219067; 300293; 400729; 500708; 900505.

4. 984003; 780010; 650050; 540090; 501001; 702003; 900009.

Express in figures:

5. Two thousand three hundred sixty. Four thousand four hundred sixty-one. Five thousand one hundred three. Five thousand ten. Six thousand twenty. Seven thousand twenty-four. Eight thousand one hundred eleven. Nine thousand eleven. Four thousand four. Five thousand six. Nine thousand three. Four thousand one. Ten thousand four hundred twenty-three. Twelve thousand five hundred. Seventeen thousand eight hundred. Nineteen thousand nineteen.

6. Twenty-five thousand seven hundred ninety-three. Seventy thousand eighty. Forty thousand ninety. Ninety thousand eleven. Eighty thousand three hundred six. Thirty thousand ten.

7. One hundred one thousand four hundred twenty-four. One hundred nine thousand one hundred nine. Two hundred eight thousand four hundred fifty. Seven hundred fifty thousand fifty-one. Nine hundred ten thousand ten. Nine hundred eight thousand five. Two hundred six thousand six. Three hundred thousand three. Four hundred thousand four. Nine hundred thousand one. Two hundred fifty thousand fifty.

ROMAN NOTATION

ROMAN AND ARABIC NUMERALS

	ROMAN	ARABIC		ROMAN	ARABIC
One	I	1	Twenty	XX	20
Two	II	2	Thirty	XXX	30
Three	III	3	Forty	XL	40
Four	IV	4	Fifty	L	50
Five	V	5	Sixty	LX	60
Six	VI	6	Seventy	LXX	70
Seven	VII	7	Eighty	LXXX	80
Eight	VIII	8	Ninety	XC	90
Nine	IX	9	One Hundred	C	100
Ten	X	10	Two Hundred	CC	200
Eleven	XI	11	Three Hundred	CCC	300
Twelve	XII	12	Four Hundred	CCCC or	
Thirteen	XIII	13		CD	400
Fourteen	XIV	14	Five Hundred	D	500
Fifteen	XV	15	Six Hundred	DC	600
Sixteen	XVI	16	Seven Hundred	DCC	700
Seventeen	XVII	17	Eight Hundred	DCCC	800
Eighteen	XVIII	18	Nine Hundred	CM	900
Nineteen	XIX	19	One Thousand	M	1000

The Roman notation is used in numbering the chapters of books and marking the dates on monuments, etc. As we know, watches and clocks are commonly marked by Roman numerals. Numbers above 2000 are rarely expressed in Roman notation.

A horizontal line written above a character multiplies its value by 1,000. For example, \overline{V} stands for 5,000.

From the above table it will be noticed that there are

characters for one (I), ten (X), hundred (C), thousand (M); for five (V), fifty (L), and for five hundred (D).

Also for four (IV), forty (XL), for four hundred (CD), and for nine (IX), ninety (XC), and nine hundred (CM). In the case of these latter the value of the characters is obtained by subtracting the values of the letters. Thus XC stands for ninety, which is the difference of the values of C and X.

There are also characters for six (VI), eleven (XI), twenty (XX), the value being obtained by adding the values of the letters.

In Roman notation, the values of characters are added except when a smaller comes before a larger. In the latter case the values are subtracted.

For example, IV stands for 4, or $5 - 1$.

In the Roman notation other numbers, not given by the table, are expressed by combining the symbols of the above numerals. To express a number in the Roman notation, select from the above symbols that one which stands for the number nearest to the given number. Treat the remainder in the same manner, and so on. To illustrate: Take the number 1912. In the above list there is a symbol for 1,000, also one for 900, and one for 12. Combining these, we have MCMXII, which is the Roman method of writing 1912.

Write in Roman numerals the present year, your own age.

ADDITION

EXERCISE 5 (Written)

○ ○		○ ○ ○		○ ○ ○ ○ ○
○ ○		○ ○ ○		○ ○ ○ ○ ○ ○
○ ○		○ ○ ○		○ ○ ○ ○ ○ ○
○ ○		○ ○ ○		○ ○ ○ ○ ○ ○
○ ○		○ ○ ○		○ ○ ○ ○ ○ ○
○ ○	+	○ ○ ○ ○	=	○ ○ ○ ○ ○ ○
○ ○ ○		○ ○ ○ ○		○ ○ ○ ○ ○ ○
○ ○ ○		○ ○ ○ ○		○ ○ ○ ○ ○ ○
○ ○ ○		○ ○ ○ ○		○ ○ ○ ○ ○ ○
○ ○ ○		○ ○ ○ ○		○ ○ ○ ○ ○ ○
24 +		35 =		59

Add: To add the numbers we first break up
 24 into two parts, 2 tens and four ones, and
 35 into two parts, 3 tens and five ones; we
 then add the 5 ones and the four ones, and
 write the result, 9 ones. Next, add the 3
 tens and the two tens and write the result, 5 tens.

Or we may solve the example in this way:

$$\begin{array}{l}
 24 = 2 \text{ tens} + 4 \text{ units} \\
 35 = 3 \text{ tens} + 5 \text{ units} \\
 \hline
 59 = 5 \text{ tens} + 9 \text{ units}
 \end{array}$$

Add:

<u>21</u>	<u>21</u>	<u>21</u>	<u>21</u>	<u>21</u>	<u>32</u>	<u>33</u>	<u>33</u>	<u>33</u>
<u>32</u>	<u>33</u>	<u>34</u>	<u>35</u>	<u>36</u>	<u>43</u>	<u>44</u>	<u>45</u>	<u>46</u>

Add :

11	11	21	51	12	22	13	14	33	22
21	22	31	21	13	33	13	12	33	22
31	32	41	11	14	44	13	11	33	22

$$\begin{array}{r}
 \text{Add:} \quad \circ \circ \quad \quad \quad \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \circ \circ \\
 27 \quad \quad \circ \circ \quad \quad \quad \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \circ \circ \\
 36 \quad \quad \circ \circ \quad \quad \quad \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \circ \circ \\
 \hline 63 \quad \quad \circ \circ \circ \quad \quad \quad \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \circ \circ \\
 \quad \quad \circ \circ \circ \quad + \quad \circ \circ \circ \circ \quad = \quad \circ \circ \circ \circ \circ \circ \\
 \quad \quad \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \circ \circ \\
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 \quad \quad \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \quad \quad \quad \circ \circ \circ \circ \circ \circ \circ \\
 \hline
 \end{array}$$

27 + 36 = 63

We again break up the numbers into tens and ones. 6 ones and 7 ones make 13 ones, or 1 ten and 3 ones. Write 3. Add the 1 ten to the 3 tens and 2 tens in the second column, which makes 6 tens or

$$27 = 2 \text{ tens} + 7 \text{ units}$$

$$36 = 3 \text{ tens} + 6 \text{ units}$$

$$63 = 5 \text{ tens} + 13 \text{ units}$$

Since $13 = 1 \text{ ten} + 3 \text{ units}$ we may express this sum thus :

$$5 \text{ tens}$$

$$\underline{1 \text{ ten} + 3 \text{ units}}$$

$$6 \text{ tens} + 3 \text{ units} = 60 + 3 = 63$$

or, we may add 27 and 63 in this way :

27 Write the numbers one under the other so
 36 that the units' figures are in one column,
63 and the tens' figures are in one column. Add
 the units' column: 7 and 6 are 13. Write
 down 3 in the units' place in the answer. We do
 not write down the 1 but **carry** it,—that is, we
 add 1 to the tens' column thus, $1 + 2 + 3 = 6$;
 write down 6 in the tens' place in the
 answer.

RULE FOR ADDITION: Write the numbers to be
 added in columns so that all the units' figures are in one
 column and all the tens' figures in one column. Add
 the units' figures. Write the units' figure of the sum
 beneath in the units' column. If there is a tens' figure,
 add it to the tens' column and write the tens' figure of
 the answer in the tens' column and write the hun-
 dreds' figure, if any, at the left.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11	12	15	14	17	21	26	34	37
<u>21</u>	<u>27</u>	<u>32</u>	<u>42</u>	<u>52</u>	<u>63</u>	<u>62</u>	<u>53</u>	<u>61</u>
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
21	22	32	42	52	63	63	36	35
<u>34</u>	<u>32</u>	<u>24</u>	<u>26</u>	<u>31</u>	<u>32</u>	<u>12</u>	<u>21</u>	<u>51</u>
(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
25	47	49	38	74	82	75	24	29
<u>38</u>	<u>34</u>	<u>37</u>	<u>27</u>	<u>19</u>	<u>14</u>	<u>18</u>	<u>67</u>	<u>63</u>

(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)
33	37	41	45	48	52	13	17	18
<u>59</u>	<u>55</u>	<u>49</u>	<u>47</u>	<u>39</u>	<u>38</u>	<u>34</u>	<u>27</u>	<u>24</u>
(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)
19	21	23	24	26	12	14	16	18
22	35	38	29	37	34	29	27	26
<u>37</u>	<u>36</u>	<u>37</u>	<u>28</u>	<u>19</u>	<u>37</u>	<u>40</u>	<u>50</u>	<u>25</u>
(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)
20	23	26	28	46	44	42	39	37
19	29	28	34	29	15	16	14	17
<u>18</u>	<u>31</u>	<u>44</u>	<u>39</u>	<u>28</u>	<u>27</u>	<u>26</u>	<u>19</u>	<u>34</u>

55. A man bought a bookcase for \$26, a desk for \$18, and a chair for \$13. What was his bill?

56. A schoolboy bought a reader for 25¢, a spelling book for 18¢, and an arithmetic for 20¢. How much did he pay in all?

57. How much money will buy one peck of apples at 17¢ a peck, a dozen oranges at 35¢ a dozen, and a dozen lemons at 24¢ a dozen?

58. How much money will buy 1 lb. of coffee at 28¢ a pound, 5 lb. of sugar for 24¢, and 1 lb. of tea at 38¢?

59. A farmer has 29 tons of hay in one barn, 15 tons in another barn, and 16 tons in the field. How many tons of hay has the farmer in all?

EXERCISE 6 (Written)

Write in columns and add :

1. $41 + 19 + 32 =$

8. $24 + 34 + 14 =$

2. $51 + 18 + 13 =$

9. $25 + 18 + 17 =$

3. $35 + 29 + 23 =$

10. $26 + 19 + 12 =$

4. $37 + 28 + 19 =$

11. $33 + 35 + 16 =$

5. $36 + 27 + 18 =$

12. $37 + 31 + 19 =$

6. $24 + 26 + 28 =$

13. $50 + 29 + 17 =$

7. $17 + 27 + 37 =$

14. $45 + 36 + 18 =$

15. A man pays \$24 a month for board, \$12 a month for room rent, and \$9 a month for other expenses. How much does he spend in all?

16. A man pays \$25 for a suit of clothes, \$4 for a pair of shoes, and \$18 for an overcoat. How much does he pay in all?

17. A farmer plants 17 A. (acres) in corn, 27 A. in cotton, and 15 A. in wheat. How many acres does the farmer plant?

18. In a farm there are 24 A. in pasture, 15 A. in meadow, and 42 A. in corn. How many acres in the farm?

19. A schoolgirl buys a language book for 35¢, a satchel for 20¢, and a knife for 35¢. What is her bill?

20. A man buys 2 milch cows for \$45 and \$42 respectively. What did he pay for both?

21. Find the cost of 1 doz. (dozen) eggs at 25 ¢ a doz., 2 lb. of meat at 17 ¢ a pound.

22. A peck of potatoes costs 23 ¢. Find the cost of three pecks.

23. A side of a square is 17 ft. Find the distance around the square.

24. A rectangular garden is 18 yd. by 15 yd. How many yards in its four sides?

25. A city lot is 14 yd. by 32 yd. How many yards of fence will inclose it?

26. A certain city block is 40 rds. by 25 rds. How many rods is it around it?

EXERCISE 7 (Written)

Add:

445	To add several numbers having two or
782	more figures, first, write the numbers so
568	that all the units' figures are in one ver-
<u>1795</u>	tical column, all the tens in one vertical

column, and all the hundreds in one vertical column. Next, we add the units; namely, in this example, 8, 2, 5. The sum is 15 units, or 1 ten and 5 units. Write the 5 units in the column for units. Next we add the 1 ten obtained to the 6, 8, and 4 tens in the second column; the result is 19 tens, or 1 hundred and 9 tens. Write the 9 in the column for tens. The 1 hundred we add to the 5, 7, and 4 hundreds, giving 17 hundreds. Write the 17 to the left of the tens. The sum is 1,795.

Add: (1)	(2)	(3)	(4)	(5)	(6)
232	447	438	524	417	318
429	208	809	410	326	421
<u>207</u>	<u>209</u>	<u>174</u>	<u>129</u>	<u>227</u>	<u>319</u>

7. A planter sells four bales of cotton whose weights are respectively 489 lb., 478 lb., 503 lb., and 512 lb. How many pounds of cotton does he sell?

8. The lengths of the four sides of a field are 572 yd., 329 yd., 568 yd., and 337 yd. How many yards in the four sides of the field?

9. Three lots planted in wheat yield respectively 417, 499, 523 bu. How many bushels do the lots yield in all?

10. A ranchman has four flocks of sheep numbering respectively 234, 937, 357, and 523 sheep. How many sheep has he in all?

11. The dimensions of a rectangle are 648 and 286 ft. How many feet are in the four sides of the rectangle?

12. A railroad system has 756 miles in one state, 386 miles in another, and 476 miles in a third. How many miles in the system?

13. A drummer makes \$173 in January, \$148 in February, \$157 in March, and \$290 in April. How much does he make in all?

14. A jobber sells on four successive days 217, 275, 338, and 319 bbls. of flour. Find his total sales.

(15)	(16)	(17)	(18)	(19)	(20)
144	273	225	432	738	904
327	903	429	418	568	321
<u>592</u>	<u>637</u>	<u>328</u>	<u>832</u>	<u>283</u>	<u>497</u>

(21)	(22)	(23)	(24)	(25)	(26)
334	473	368	429	937	828
543	845	467	594	275	456
<u>693</u>	<u>909</u>	<u>808</u>	<u>520</u>	<u>460</u>	<u>737</u>

27. A farmer sold three bales of cotton; the first bale weighed 478 lb., the second bale, 492 lb., and the third bale, 459 lb. How much did the three bales together weigh?

28. A man owns three farms, one containing 150 A., one, 218 A., and one, 129 A. How many acres does he own in all?

29. A man has three apple orchards. The first yields 265 bbl. of apples, the second, 362 bbl., and the third, 286 bbl. How many barrels of apples do the orchards yield in all?

EXERCISE 8 (Written)

Add:

(1)	(2)	(3)	(4)	(5)	(6)
429	583	213	576	392	273
538	604	902	776	235	940
790	794	584	628	806	294
<u>392</u>	<u>714</u>	<u>222</u>	<u>233</u>	<u>556</u>	<u>438</u>

(7)	(8)	(9)	(10)	(11)	(12)
524	537	592	604	609	519
683	297	348	792	456	654
853	728	518	809	706	904
<u>218</u>	<u>275</u>	<u>293</u>	<u>394</u>	<u>738</u>	<u>556</u>

(13)	(14)	(15)	(16)	(17)	(18)
714	727	739	763	774	792
619	692	638	647	658	509
234	432	342	567	456	765
<u>991</u>	<u>984</u>	<u>976</u>	<u>923</u>	<u>579</u>	<u>937</u>

(19)	(20)	(21)	(22)	(23)	(24)
528	532	539	547	555	564
493	484	475	469	628	486
693	538	835	706	607	705
<u>926</u>	<u>919</u>	<u>909</u>	<u>344</u>	<u>666</u>	<u>777</u>

25. A railroad passenger travels 310 miles the first day, 380 miles the second day, 285 miles the third day, and 219 miles the fourth day. How far does the man travel in the four days?

26. A dry goods merchant makes \$ 415 in January, \$257 in February, \$178 in March, and \$319 in April. How much does he make in the four months?

27. A commission merchant sells, on Monday, 450 bales of cotton, on Tuesday, 273 bales, on Wednesday, 529 bales, and on Thursday, 93 bales. How many bales does he sell in all?

28. A ranchman sold 379 head of cattle in October, 753 head in November, 432 head in December, and 600 head in January. How many head of cattle did the ranchman sell in all?

EXERCISE 9 (Written)

Write in columns and add :

1. $218 + 94 + 462 + 219 + 173 =$
2. $725 + 409 + 93 + 797 + 8 =$
3. $523 + 514 + 96 + 798 + 90 =$
4. $937 + 846 + 394 + 97 + 108 =$
5. $456 + 653 + 900 + 278 + 19 =$
6. $917 + 418 + 696 + 84 + 17 =$
7. $276 + 467 + 509 + 59 + 28 =$
8. $218 + 337 + 744 + 538 + 927 =$
9. $963 + 217 + 345 + 99 + 29 =$
10. $804 + 593 + 392 + 57 + 16 =$
11. $29 + 97 + 173 + 178 + 589 =$
12. $79 + 478 + 384 + 67 + 26 =$
13. $9 + 89 + 294 + 938 + 517 =$
14. $11 + 111 + 929 + 528 + 76 =$
15. $38 + 691 + 14 + 140 + 798 =$
16. $37 + 77 + 519 + 694 + 93 =$
17. $25 + 95 + 98 + 508 + 909 =$
18. $605 + 77 + 99 + 430 + 590 =$
19. $659 + 924 + 494 + 56 + 65 =$

20. A cornfield is 328 yd. long and 279 yd. wide. If a man plows a furrow around the field, what will be the length of the furrow?

21. A public hall is 157 ft. long and 94 ft. wide. What is the distance in feet around the hall?

22. A park in the shape of a rectangle is 752 ft. long and 638 ft. wide. What is the distance in feet around the park?

23. One side of a square farm is 440 yd. What is the distance in yards around the farm?

24. If one side of a square is 850 yd., what is the distance in yards around the square?

25. The length of a rectangle is 479 yd. and its width 428 yd. What is the distance in yards around the rectangle?

26. A field in the shape of a rectangle is 978 yd. long and 876 yd. wide. What is the distance in yards around the field?

REVIEW

EXERCISE 10 (Written or Oral)

1. A milkman has 32 qt. of milk. How many gallons has he?

2. A family takes a pint of milk every morning and a pint every evening. If they have to pay 4¢ a pint for milk, find their bill for a week.

3. At 15¢ a peck, how much will a bushel of potatoes cost?

4. James picked 37 qt. of cherries on Monday, 21 qt. on Tuesday, and 11 qt. on Wednesday. How many quarts of cherries did he pick in all?

5. A commission merchant sold 23 bu. of potatoes to one grocer, 26 bu. to another grocer, and 35 bu. to another grocer. How many bushels did he sell in all?

6. John rode 21 mi. (miles) on his bicycle on Wednesday, 32 mi. on Thursday, 26 mi. on Friday, and 17 mi. on Saturday. How many miles did he ride in all?

7. Out of a barrel containing $2\frac{1}{2}$ bu. of apples 5 pk. are sold. How many pecks remained in the barrel?

8. There are three bookcases in my library. In one there are 297 volumes, in another 129, and in the third 174. How many books have I in my library?

9. A coal merchant sold in four successive weeks 299 T. of coal, 318 T., 548 T., and 529 T. How many tons of coal did he sell in all?

EXERCISE 11 (Written)

Add :

(1)	(2)	(3)	(4)	(5)	(6)
4,298	5,460	1,235	7,890	9,460	6,712
8,339	5,173	6,337	8,969	7,010	9,217
6,038	9,997	7,893	4,567	7,643	4,673
8,865	9,683	7,788	8,778	5,566	9,992
<u>9,463</u>	<u>4,927</u>	<u>3,895</u>	<u>9,096</u>	<u>7,788</u>	<u>6,666</u>

(7)	(8)	(9)	(10)	(11)	(12)
6,333	8,442	392	7,909	7,389	2,299
2,078	1,859	1,428	4,617	5,351	6,874
7,398	7,662	9,293	9,853	2,771	9,960
7,986	7,597	6,826	5,683	4,559	3,819
<u>2,364</u>	<u>1,648</u>	<u>1,294</u>	<u>9,894</u>	<u>9,207</u>	<u>9,866</u>
(13)	(14)	(15)	(16)	(17)	(18)
1,072	4,328	6,307	7,609	7,876	8,687
9,516	9,796	9,936	2,365	4,185	4,908
5,901	7,716	7,983	8,252	8,523	8,796
9,349	9,628	9,909	1,934	4,649	4,964
5,281	5,921	6,244	6,569	6,896	7,556
7,889	8,224	8,561	7,089	7,524	7,961
<u>9,729</u>	<u>1,984</u>	<u>2,441</u>	<u>3,864</u>	<u>4,298</u>	<u>4,756</u>
(19)	(20)	(21)	(22)	(23)	(24)
80,818	85,648	90,499	95,369	20,012	76,007
81,218	86,448	91,699	96,969	12,891	23,567
39,844	45,294	50,785	56,255	61,766	67,296
72,847	78,417	84,008	89,619	95,249	35,213
46,815	52,645	58,495	64,366	70,257	76,167
82,098	88,048	94,019	42,624	47,704	52,805
57,925	63,066	68,226	78,607	83,828	89,068
<u>99,600</u>	<u>64,526</u>	<u>75,627</u>	<u>92,429</u>	<u>98,069</u>	<u>49,725</u>

25. How far will a man walk in going around a rectangular tract of land 3,584 yd. long and 1,768 yd. wide?

26. How many pounds in four loads of coal which weigh 6,680 lb., 6,950 lb., 7,290 lb., and 5,478 lb.?

27. A grain merchant sells on Monday 2,578 bu. of wheat; on Tuesday, 7,950 bu.; on Wednesday, 6,419 bu.; and on Thursday, 8,907 bu. How many bushels does he sell in all?

EXERCISE 12 (Written)

Write in columns and add:

1. $9696 + 9749 + 1556 + 1717 + 2792 + 2846 =$

2. $7284 + 7618 + 7674 + 7729 + 8288 + 8849 =$

3. $5849 + 6436 + 7025 + 7616 + 8209 + 8804 =$

4. $3958 + 4465 + 4974 + 5485 + 5998 + 6512 =$

5. $7548 + 8069 + 8592 + 9216 + 9643 + 2307 =$

6. $3387 + 4474 + 5021 + 570 + 2674 + 7228 =$

7. $9468 + 1739 + 2312 + 2886 + 3463 + 4623 =$

8. $6377 + 8744 + 9341 + 9940 + 876 + 4249 =$

9. $5481 + 7969 + 8596 + 9225 + 4329 + 6276 =$

10. $2896 + 3569 + 4921 + 9716 + 3697 + 5543 =$

11. $6783 + 7406 + 9288 + 3748 + 4394 + 6364 =$

12. William Dragoo bought for a ranch five tracts of land containing respectively 3,275 A., 968 A., 1,728 A., 3,425 A., and 840 A. How many acres in his ranch?

13. A merchant's receipts for one week were, on Monday, \$892; on Tuesday, \$1,288; on Wednesday, \$1,548; on Thursday, \$887; on Friday, \$954; and

on Saturday, \$1,889. What were his total receipts for the week?

14. In a certain city there are five schools; the first has 978 pupils; the second, 864; the third, 1,194; the fourth, 758; and the fifth, 967. What is the total number of children in the five schools?

15. There are six wards in a certain city. The population of the first ward is 7,294; of the second ward, 6,590; of the third ward, 5,428; of the fourth ward, 6,696; of the fifth ward, 7,182; and of the sixth ward, 4,997. Find the population of the city.

SUBTRACTION

A man has \$3.00 on his return from town, and had \$7.00 when he went to town. How much did he spend in town?

If a farmer has 5 cows now and had 12 before, how many cows has he sold? How many cows must be added to 5 cows to make 12 cows?

A roll of carpet from which a piece has been taken off is now 6 yd. long. The roll was 10 yd. in length. Find the length of the piece cut off.

(1)	(2)	(3)
\$7, minuend	12 cows, minuend	10 yards, minuend
\$3, subtrahend	5 cows, subtrahend	4 yards, subtrahend
\$4, difference	7 cows, difference	6 yards, difference

In example (1) the **minuend** is \$7, the **subtrahend** is \$3, and the **difference** is \$4. In example (2) the **minuend** is 12 cows, the **subtrahend** is 5 cows, and

the **difference** is 7 cows. In example (3) the **minuend** is 10 yd., the **subtrahend** is 4 yd., and the **difference** is 6 yd.

What is the sum of the difference and the subtrahend in each of the above examples? In subtraction what is the sum of the difference and the subtrahend always equal to?

$47 - 24 = ?$ The num-

bers being
47 too large to
24 subtract
23 orally, we

break them up into parts
as we did in addition on
page 88: 4 tens and 7
ones; 2 tens and 4 ones.
4 ones and 3 ones make

○○○○	○○	○○
○○○○	○○	○○
○○○○	○○	○○
○○○○○	○○	○○
○○○○○	○○	○○
○○○○○	—	=
○○○○○	○○	○○
○○○○○	○○○	○○
○○○○○	○○○	○○○
○○○○○	○○○	○○○
○○○○○	○○○	○○○

7 ones. Write 3 in the column for ones in the difference. 2 tens and 2 tens make 4 tens. Write 2 in the tens' column of the difference. The answer is 23.

EXERCISE 13 (Written)

Subtract:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
29	27	38	35	57	44	49	69	75
<u>16</u>	<u>12</u>	<u>11</u>	<u>21</u>	<u>20</u>	<u>30</u>	<u>22</u>	<u>35</u>	<u>41</u>
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
70	58	67	76	83	95	66	88	94
<u>20</u>	<u>28</u>	<u>37</u>	<u>25</u>	<u>61</u>	<u>32</u>	<u>43</u>	<u>54</u>	<u>82</u>

Subtraction is finding the **difference** of two numbers. It is finding what is left if one number is taken from the other. It is also finding what number added to the smaller will make the larger. For example :

Subtract 498 from 852.

852 We cannot subtract 8 from 2, so we say
 498 52 = 40 + 12 and subtract 8 from 12, leaving
354 4. We write down 4 in the units' place of
 the answer and have 4 instead of 5 left in
 the tens' place of the minuend. We cannot subtract
 9 from 4. So we say 84 = 70 + 14, and subtract 9
 from 14, giving 5 for the tens' figure of the answer,
 and having 7 instead of 8 in the hundreds' place of
 the minuend. We then subtract 4 from 7, giving 3.
 That is, taking 498 from 852 leaves 354.

As 100 = 10 tens, 10 = 10 ones,
 so 800 = 7 hundred + 10 tens
 50 = 4 tens + 10 ones
 2 = 2 ones
 and 852 = 7 hundreds + 14 tens + 12 ones
 498 = 4 hundreds + 9 tens + 8 ones
 354 = 3 hundreds + 5 tens + 4 ones

The process is 8 from 12 leaves 4, 9 from 14 leaves 5, 4 from 7 leaves 3.

ADDITIVE METHOD OF SUBTRACTION

The method of performing subtraction explained on page 104 is easy to understand, but it is slow and is now disappearing. A better method is that based on the method of reckoning change in offices and shops. This method keeps in mind the fundamental idea that the difference of two numbers is the number which added to the subtrahend produces the minuend, and that the purpose of subtraction is to get this number as quickly as possible. In other words, the worker always looks forward to get the result sought. An example will illustrate the process.

From 11,852 take 7,498.

$\begin{array}{r} 11,852 \\ 7,498 \\ \hline 4,354 \end{array}$	Obtain the figures of the answer by finding the figures that added to those of the second number will produce the corresponding figures of the other number.
--	--

The process is: 8 and 4 are 12, write 4, carry 1;
 10 and 5 are 15, write 5, carry 1;
 5 and 3 are 8, write 3;
 7 and 4 are 11, write 4.

The answer is 4,354.

In the second line of this process 10 is 9 and the 1 carried; and in the third line 5 is 4 and the 1 carried.

From 7,238 take 4,929.

$$\begin{array}{r} 7,238 \\ 4,929 \\ \hline 2,309 \end{array}$$

Process : 9 and 9 are 18, write 9, carry 1 ;

3 and 0 are 3, write 0 ;

9 and 3 are 12, write 3, carry 1 ;

5 and 2 are 7, write 2.

Answer is 2,309.

EXERCISE 14 (Written)

Subtract ;

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
31	42	54	65	71	80	77	90	63	36
17	13	26	28	37	41	48	9	19	18

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
237	323	405	709	924	555	328	765	631	933
<u>129</u>	<u>219</u>	<u>207</u>	<u>310</u>	<u>229</u>	<u>456</u>	<u>174</u>	<u>368</u>	<u>235</u>	<u>176</u>

(21)	(22)	(23)	(24)	(25)	(26)
5,208	7,939	5,322	9,211	8,200	9,400
<u>2,209</u>	<u>5,245</u>	<u>3,119</u>	<u>1,728</u>	<u>4,111</u>	<u>6,403</u>

(27)	(28)	(29)	(30)	(31)
5,461	6,523	3,546	6,742	3,867
<u>3,237</u>	<u>4,416</u>	<u>2,271</u>	<u>3,619</u>	<u>2,456</u>

(32)	(33)	(34)	(35)	(36)	(37)
8,209	7,103	9,205	5,223	9,403	7,938
<u>5,301</u>	<u>1,294</u>	<u>2,298</u>	<u>1,325</u>	<u>4,594</u>	<u>7,739</u>

(38)	(39)	(40)	(41)	(42)	(43)
9,444	6,307	50,000	27,403	39,204	17,307
<u>2,547</u>	<u>1,499</u>	<u>21,201</u>	<u>9,605</u>	<u>9,109</u>	<u>4,408</u>
(44)	(45)	(46)	(47)	(48)	
26,845	53,103	100,000	27,402	54,276	
<u>15,856</u>	<u>12,999</u>	<u>297</u>	<u>16,386</u>	<u>41,823</u>	
(49)	(50)	(51)	(52)		
125,670	7,832	8,326	5,634		
<u>103,276</u>	<u>6,456</u>	<u>4,732</u>	<u>3,278</u>		

53. The population of Dallas, Texas, in 1910 was 92,104, and in 1900 its population was 42,638. Find the increase in ten years.

54. In 1910 the population of Harrisburg, Pennsylvania, was 64,186, and in 1900 its population was 50,167. Find the gain in population.

55. Hartford, Connecticut, had a population of 98,915 in 1910, and a population of 79,850 in 1900. Find the gain in population.

56. Annapolis, Maryland, in 1910, had a population of 8,609, and in 1900, 8,402. Find the increase in population.

57. Pike's Peak is 14,108 ft. high and Fremont Peak is 13,790 ft. high. How many feet higher is Pike's Peak than Fremont Peak?

58. Maryland contains 12,210 sq. mi. and New Jersey contains 7,815 sq. mi. How much larger is Maryland than New Jersey?

59. Ohio contains 41,060 sq. miles and South Carolina contains 30,570 sq. miles. How much larger is Ohio than South Carolina?

60. The area of Texas is 265,780 sq. mi. and the area of New York is 49,170 sq. mi. How many more square miles does Texas contain than New York?

EXERCISE 15 (Written)

- | | |
|-------------------------|-------------------------|
| 1. $3,294 - 1,718 = ?$ | 11. $7,169 - 2,858 = ?$ |
| 2. $6,917 - 828 = ?$ | 12. $6,118 - 4,927 = ?$ |
| 3. $5,264 - 2,893 = ?$ | 13. $4,702 - 2,713 = ?$ |
| 4. $4,165 - 1,828 = ?$ | 14. $5,888 - 1,999 = ?$ |
| 5. $4,054 - 1,815 = ?$ | 15. $5,567 - 3,994 = ?$ |
| 6. $9,189 - 6,803 = ?$ | 16. $5,486 - 869 = ?$ |
| 7. $7,803 - 6,788 = ?$ | 17. $9,430 - 6,995 = ?$ |
| 8. $5,672 - 4,275 = ?$ | 18. $6,008 - 29 = ?$ |
| 9. $6,079 - 4,084 = ?$ | 19. $1,001 - 14 = ?$ |
| 10. $7,075 - 6,766 = ?$ | 20. $5,005 - 49 = ?$ |

21. A man has \$1,000; he owes two debts, one of \$350, the other of \$273. After paying both debts, how many dollars will he have?

22. Mr. Henry Thomas owns a house and lot worth \$2,700, a farm worth \$1,800; and he owes \$570. How much does Mr. Thomas own above debts?

23. A man bought two suits of clothes; one suit cost \$12, the other \$15. He gave in payment a hundred-dollar bill. How much change did he receive?

24. A clerk gets a salary of \$75 a month; he spends \$18 a month for board, \$8 a month for room rent, \$12 a month for other expenses, and he saves the remainder of his salary. How much does he save in a month?

25. A newsboy has \$23 in bank. How much must he add to it to make \$100?

26. The population of Philadelphia in 1910 was 1,549,008. The population of Cincinnati the same year was 364,463, and of Buffalo 423,715. How many more people lived in Philadelphia than in Cincinnati and Buffalo combined?

MULTIPLICATION

$289 \times 5 = ?$ We may work this example by addition as follows:

$$\begin{array}{r} 289 \\ 289 \\ 289 \\ 289 \\ 289 \\ \hline 1445 \end{array}$$

We may shorten this work as follows:

$$\begin{array}{r} 289 \\ 5 \\ \hline 1445 \end{array}$$

5 nines are 45. Write 5, carry 4. 5 eights are 40. 40 and 4 are 44. Write 4, carry 4. 5 twos are 10. 10 and 4 are 14. Write 14. The answer is 1,445.

The number to be repeated is called the **multipl-**
cand.

The number which shows how many times the mul-
tiplicand is to be repeated is called the **multiplier.**

The result of multiplying one number by another
is called the **product.**

Multiplication is a short method of addition when
the numbers to be added are the same.

If we multiply zero, or naught, by any number, the
product is naught. If we think a moment, we can
see that nothing taken any number of times is still
nothing.

Again, if we multiply any number by naught, the
product is naught.

If we think a moment, we can see that a number
taken no times must be nothing; for example, 2 is
two taken once. If taken no times it is, of course,
nothing.

NOTE. The teacher should talk over this property of zero
with the class.

EXERCISE 16 (Written)

Multiply :

1. 24 by 2, by 4, by 6, by 8.
2. 35 by 3, by 5, by 7, by 9.
3. 42 by 3, by 6, by 9, by 8.
4. 54 by 4, 6, 8, 9.
5. 63 by 3, 5, 7, 9.
6. 84 by 5, 7, 9, 8.
7. 96 by 6, 8, 9, 4.
8. 112 by 4, 7, 9, 6.
9. 185 by 5, 7, 9.
10. 293 by 8, 9, 7, 4.

- | | |
|------------------------|--------------------------|
| 11. 304 by 4, 5, 6, 8. | 15. 786 by 6, 7, 8, 9. |
| 12. 462 by 6, 7, 8, 9. | 16. 1,208 by 7, 5, 8, 6. |
| 13. 503 by 4, 6, 8, 9. | 17. 5,409 by 6, 7, 8, 9. |
| 14. 607 by 7, 6, 5, 8. | 18. 6,754 by 5, 6, 7, 8. |

$$209 \times 10 = ?$$

$\begin{array}{r} 209 \\ 10 \\ \hline 2090 \end{array}$
 10 nines are 90. Write 0, carry 9.
 10 naughts are 0. 0 and 9 are 9.
 Write 9. 10 twos are 20. Write 20.
 The product is 2,090.

Notice that the product contains the same figures as the multiplicand with a naught added in the units' place. Hence, to multiply a number by 10, write down the number with 0 to the right of it.

$$209 \times 20 = ?$$

$\begin{array}{r} 209 \\ 20 \\ \hline 4180 \end{array}$
 To multiply a number by 20 gives twice as large a product as to multiply the same number by 10. Hence, to multiply by 20, multiply the multiplicand by 2, write down this product with 0 to the right of it.

In like manner we can multiply by 30, 40, 50, 60, 70, 80, 90.

EXERCISE 17 (Written)

Multiply:

1. 125 by 20, 30, 40, 70.
2. 274 by 10, 30, 50, 70, 90.
3. 508 by 30, 50, 70, 90.
4. 964 by 10, 30, 50, 70.
5. 1,491 by 20, 40, 60, 80.

6. 3,915 by 30, 60, 90, 80.
7. 7,778 by 20, 50, 40, 80.
8. 510 by 30, 50, 70, 90.
9. 1,060 by 30, 70, 90, 80.
10. 21,600 by 50, 70, 90.
11. 30,500 by 60, 80, 90.
12. 40,400 by 70, 80, 90, 60.
13. 120,600 by 70, 90, 60, 40.

$$564 \times 36 = ?$$

$$\begin{array}{r} 564 \\ 36 \\ \hline 3384 \\ 16920 \\ \hline 20304 \end{array}$$

Remember that $36 = 30 + 6$.

First multiply the multiplicand by 6. The product thus obtained is known as a **partial product**. Next multiply the multiplicand by 30. This product is also known as a **partial product**.

Notice that the units' figure in the second partial product is 0. When 4 and naught are added the result is 4, just the same as if there were no figure at all in place of 0. Hence, we have a shorter method of multiplying, as follows:

$$564 \times 36 = ?$$

$$\begin{array}{r} 564 \\ 36 \\ \hline 3384 \\ 1692 \\ \hline 20304 \end{array}$$

We first multiply by 6, then we multiply by 3 and write the first figure of the partial product under 3 in the multiplier. When we add the partial products, we obtain the same answer that we did before.

To multiply a number by a multiplier of two figures, first, **multiply the multiplicand by the units' figure of the multiplier and write the product**

so that its units' figure stands in the units' column ; next, multiply the multiplicand by the tens' figure of the multiplier, and write the first figure of this partial product in the tens' column directly under the figure of the multiplier that produced it. Then add the partial products.

EXERCISE 18 (Written)

Multiply :

- | | | |
|---------------|----------------|------------------|
| 1. 23 by 14. | 11. 105 by 35. | 21. 144 by 36. |
| 2. 25 by 16. | 12. 125 by 18. | 22. 192 by 48. |
| 3. 32 by 21. | 13. 192 by 28. | 23. 168 by 42. |
| 4. 36 by 23. | 14. 214 by 64. | 24. 696 by 58. |
| 5. 42 by 24. | 15. 235 by 72. | 25. 993 by 85. |
| 6. 47 by 25. | 16. 296 by 37. | 26. 1,471 by 75. |
| 7. 58 by 25. | 17. 300 by 68. | 27. 2,350 by 47. |
| 8. 64 by 32. | 18. 472 by 59. | 28. 425 by 85. |
| 9. 75 by 24. | 19. 568 by 81. | 29. 522 by 87. |
| 10. 96 by 36. | 20. 924 by 84. | 30. 3,428 by 69. |

$$24 \times 100 = ?$$

$$\begin{array}{r} 24 \\ 100 \\ \hline 2400 \end{array}$$

We see that 100 times 24 is 24 hundred. The result of multiplying any number by 100 is that number of hundreds.

Hence, to multiply any number by 100, write down the number with two naughts to the right of it.

To multiply any number by 200, multiply the multiplicand by 2, write down this product, with two naughts after it.

To multiply any number by 300, multiply the multiplicand by 3, write down this product, with two naughts after it.

To multiply any number by 400, multiply the multiplicand by 4, write down this product, with two naughts after it.

How shall we multiply a number by 500? By 600? By 700? By 800? By 900?

1,000 We see that 1,000 times 14 is 14,000.
 14 The result of multiplying any number by
 14,000 1,000 is that number of thousands.

Hence, to multiply any number by 1,000, write down the number and write three naughts after it.

To multiply any number by 2,000, multiply the number by 2, write down this product, with three naughts after it.

How shall we multiply a number by 3,000? By 4,000? By 5,000? By 6,000? By 7,000? By 8,000? By 9,000? By 10,000?

EXERCISE 19 (Written)

Multiply:

1. 270 by 200, 300, 500.
2. 325 by 400, 600, 800.
3. 524 by 700, 800, 900.

4. 1,215 by 300, 500, 700.
5. 3,775 by 400, 600, 800.
6. 7,384 by 500, 700, 900.
7. 1,250 by 400, 600, 800.
8. 3,750 by 500, 700, 900.
9. 9,500 by 600, 800, 900.
10. 4,200 by 400, 700, 900.
11. 6,800 by 300, 500, 800.
12. 5,250 by 200, 400, 700.

$$4,268 \times 345 = ?$$

4268	We multiply the multiplicand by
<u>345</u>	each figure of the multiplier, writ-
21340	ing the first figure of each partial
17072	product directly under the figure of
12804	the multiplier that produced it.
<u>1472460</u>	Then add the partial products.

EXERCISE 20 (Written)

- | | |
|-----------------------------|----------------------------|
| 1. $672 \times 168 = ?$ | 10. $1,968 \times 492 = ?$ |
| 2. $1,107 \times 123 = ?$ | 11. $2,682 \times 298 = ?$ |
| 3. $1,936 \times 121 = ?$ | 12. $3,184 \times 199 = ?$ |
| 4. $2,475 \times 119 = ?$ | 13. $3,488 \times 218 = ?$ |
| 5. $2,097 \times 233 = ?$ | 14. $2,025 \times 675 = ?$ |
| 6. $2,376 \times 264 = ?$ | 15. $2,988 \times 332 = ?$ |
| 7. $2,592 \times 288 = ?$ | 16. $2,376 \times 132 = ?$ |
| 8. $2,952 \times 1,028 = ?$ | 17. $676 \times 492 = ?$ |
| 9. $956 \times 239 = ?$ | 18. $1,216 \times 154 = ?$ |

19. $7,110 \times 790 = ?$

21. $1,050 \times 630 = ?$

20. $9,880 \times 247 = ?$

22. $2,080 \times 680 = ?$

23. Find the cost of 7 head of cattle at \$45 a head.
The cost of 23 head at the same rate.

24. What will a farm of 165 A. cost at \$65 an acre?

25. What will 2,180 T. of coal cost at \$7 a ton?

26. There are 36 in. in 1 yd. How many inches in 5 yd.?

27. How many inches are there in 1,760 yd.? In 5,280 yd.?

28. A train travels 33 mi. an hour? How far will it go in 4 hr.? How far will it go in 48 hr.?

29. There are 640 A. in 1 sq. mi. How many acres are in 5 sq. mi.? How many acres in 12 sq. mi.?

EXERCISE 21 (Written)

1. There are 5,280 ft. in a mile. How many feet in 2 mi.? How many feet in 5 mi.? In 30 mi.?

2. There are 1,760 yd. in a mile. How many yards in 3 mi.? How many yards in the sides of a square that has 1 mi. for a side?

3. A certain city is in the shape of a rectangle; it is 5 mi. long and 3 mi. wide. How many miles around it? How many yards around it?

4. How many pecks in 2 bu.? How many pecks in 10 bu.? How many pecks in 25 bu.?

5. How many quarts in 8 pk. ? How many quarts in 1 bu. ? How many quarts in 3 bu. ?

6. A bushel of wheat weighs 60 lb. How many pounds will 5 bu. weigh ? How many pounds will 64 bu. weigh ?

7. A train travels 35 mi. an hour. At this rate, how far will it go in 24 hr. ?

8. An ocean steamship travels at the rate of 21 mi. an hour. How far will it go in 2 da. ? In one week ?

9. The distance from New York City to Atlanta, Ga., is 882 mi. ? A train leaves New York City for Atlanta, traveling at the rate of 36 mi. an hour. How far will it be from Atlanta when it has traveled 24 hr. ?

10. Denver, Colorado, is 1,930 mi. from New York City. An express train leaves New York City for Denver, traveling at the average rate of 32 mi. an hour. How far will the train be from Denver after it has traveled 60 hr. ?

11. Trenton, N. J., is 57 mi. from New York City. Suppose a person leaves New York City for Trenton on a bicycle, traveling at the rate of 6 mi. an hour. How far will he be from Trenton after he has traveled 7 hr. ?

MULTIPLICATION TABLE

In the following table are given the products of any two numbers, from 1 to 12.

Notice that the top row of the table contains the numbers in order from 1 to 12, and that the left hand column contains the numbers from 1 to 12.

Suppose we wish to find the product of 6×7 . Run the finger along the top row of the table to 6. Then run the finger down this column from 6 until it is opposite 7, in the left hand column. We find that the square so reached is marked 42. The product of $6 \times 7 = 42$.

MULTIPLICATION TABLE

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

To find the product of any two numbers from 1 to 12, find either one of the numbers in the top row. Then run the finger down the column until opposite the other number, in the left hand column. The number so found will be the desired product.

NOTE TO TEACHER. At this point the class should be carefully drilled in the multiplication table.

DIVISION

EXERCISE 22 (Oral)

1. If \$ 24 is divided equally among 6 boys, how many dollars will each get? What is the sixth part of 24?

2. If 30 oranges are divided equally among 5 boys, how many oranges will each boy get? What is the fifth part of 30?

3. If 54¢ is divided equally among 9 girls, how many cents will each get? What is the ninth part of 54?

4. If a boy can walk 3 mi. an hour, how many hours will it take him to walk 12 mi.? How many 3's in 12?

5. If a boy can ride 7 mi. an hour on a bicycle, how many hours will it take him to ride 21 mi.? How many 7's in 21?

6. If \$ 56 is divided among a number of boys, so that each boy receives \$ 7, how many boys are there? How many 7's in 56?

7. If a cord of wood costs \$5, how many cords of wood can be bought for \$23? How many 5's are there in \$23?

8. If a pound of sugar costs 6¢, how many pounds of sugar can be bought for 25¢? How many times is 6 contained in 25?

9. How many times is 9 contained in 75? 9 is contained in 75 eight times, with 3 left over. In this example 9 is called the **divisor**, 75 is called the **dividend**, 8 is called the **quotient**, and 3 is called the **remainder**.

Division enables us to find how many times one number is contained in another number.

Divide 36 by 2.

This problem means, What is the half of 36, or how many 2's are in 36?

To work this problem, we write the 2 to the left of 36, separating them by a curved line. We then say 2 into 3 tens gives 1 ten and 1 ten over. Write the 1 directly under the 3 tens. 1 ten and 6 units are 16. 2 into 16 goes 8 times. Write 8 directly under the 6 units. The answer is 18.

To find whether our answer is right, that is, to *prove* it, we multiply 18 by 2 and get 36. 36 being the number we started with, we see that our work is right.

Such a way of proving work is called a **check**.

Divide 79 by 3.

$$\begin{array}{r} 3 \overline{)79} \end{array}$$

26, remainder 1.

To work this problem, we arrange the numbers as before.

3 into 7 tens gives 2 tens and 1 ten over. Write 2 directly under the 7 tens. 1 ten and 9 units are 19 units. 3 into 19 goes 6 times with a remainder of 1. Write 6 directly under the 9 units. The answer is 26, remainder 1.

$$\text{Check } (3 \times 26) + 1 = 79.$$

EXERCISE 23 (Written)

Divide:

- | | | | |
|-------------|--------------|--------------|--------------|
| 1. 24 by 2. | 8. 36 by 3. | 15. 48 by 4. | 22. 95 by 5. |
| 2. 46 by 2. | 9. 69 by 3. | 16. 88 by 4. | 23. 72 by 6. |
| 3. 68 by 2. | 10. 96 by 3. | 17. 52 by 4. | 24. 84 by 6. |
| 4. 74 by 2. | 11. 48 by 3. | 18. 67 by 4. | 25. 96 by 6. |
| 5. 82 by 2. | 12. 57 by 3. | 19. 76 by 4. | 26. 81 by 6. |
| 6. 92 by 2. | 13. 90 by 3. | 20. 87 by 4. | 27. 84 by 7. |
| 7. 98 by 2. | 14. 75 by 3. | 21. 96 by 4. | 28. 91 by 7. |

Divide 367 by 4.

$$\begin{array}{r} 4 \overline{)367} \end{array}$$

91, remainder 3.

Since 4 is not contained in 3, the first figure of the dividend, we take the first two figures of the dividend, 36. 4 in 36 goes 9 times, with no remainder. Write 9 directly under the 6. Now divide 4 into 7. 4 in 7 goes once, with a remainder of 3. Write the 1 under the 7, and beside it write remainder 3.

ARITHMETIC

When we take enough figures of the dividend to contain the divisor, the number so taken is called **partial dividend**.

Thus, in this example, we began the work by taking 36 as a partial dividend.

Divide the first partial dividend by the divisor, and write the quotient figure below the partial dividend that produced it, for the first figure of the answer. Take the remainder, if any, with the next figure of the dividend to complete the next partial dividend. Divide this new partial dividend by the divisor, and write the quotient at the right of the first figure of the answer. Continue in this way until all the figures of the dividend have been used. If there is any remainder from the last partial dividend, write it after the answer as remainder.

EXERCISE 24 (Written)

Divide:

- | | | |
|----------------|---------------|------------------------|
| 1. 225 by 3. | 9. 590 by 5. | 17. 847 by 7. |
| 2. 376 by 3. | 10. 693 by 5. | 18. 9,718 by 7. |
| 3. 492 by 3. | 11. 884 by 5. | 19. 6,521 by 7. |
| 4. 784 by 3. | 12. 926 by 5. | 20. 5,403 by 7. |
| 5. 1,219 by 3. | 13. 676 by 5. | 21. 9,009 by 8. |
| 6. 2,784 by 3. | 14. 696 by 6. | 22. 8,218 by 8. |
| 7. 9,480 by 3. | 15. 824 by 6. | 23. 12,750 by 8. |
| 8. 484 by 4. | 16. 986 by 6. | 24. 15,308 by 8, by 9. |

25. If a pound of sugar costs 6¢, how many pounds can be bought for 84¢?

26. When a ton of coal costs \$7, how many tons can be bought for \$98?

27. When muslin costs 8¢ a yard, how many yards can be bought for 96¢?

28. When a pair of shoes costs \$4, how many pairs can be bought for \$92?

29. If land rents for \$6 an acre, how many acres can be rented for \$78?

30. How many barrels of flour can be bought for \$150, at \$6 a barrel?

31. When hay sells at \$9 a ton, how many tons can be bought for \$243?

32. At \$5 a head, how many sheep can be bought for \$685?

33. How many school desks can be bought for \$234, if one desk costs \$3?

34. If a boy can walk 3 mi. an hour, how many hours will it take him to walk 42 mi.?

35. A man left an estate valued at \$4,790 to be divided equally among 5 children. Find each child's share.

36. A man left an estate valued at \$9,000. He left his widow \$4,000, the remainder of the estate to be divided equally among his 4 children. Find each child's share.

37. If a street car travels at the rate of 9 mi. an hour, how long will it take the car to go 108 mi.?

38. A man rides in an automobile 135 mi. in 9 hr. How far does he ride in 1 hr.?

LONG DIVISION

Divide 525 by 21.

25 21 into 52 tens is contained 2 tens
 21)525 times. Draw a line above 525. Write 2
 42 directly above the 2 in the dividend.
 105 Multiply the divisor, 21, by 2, and write
 105 the product under the 52. Subtract.

Bring down the next figure in the dividend. 21 is contained in 105, 5 times. Write the 5 above the 5 in the dividend. Multiply the 5 by the divisor, 21, and write the product, 105, under 105. The quotient is 25.

EXERCISE 25 (Written)

Divide:

- | | |
|---------------|------------------|
| 1. 273 by 21. | 9. 1,056 by 33. |
| 2. 308 by 22. | 10. 850 by 25. |
| 3. 576 by 24. | 11. 1,225 by 35. |
| 4. 325 by 13. | 12. 1,152 by 36. |
| 5. 210 by 14. | 13. 1,428 by 42. |
| 6. 336 by 16. | 14. 1,584 by 36. |
| 7. 357 by 17. | 15. 2,025 by 45. |
| 8. 480 by 32. | 16. 1,202 by 48. |

- | | |
|------------------|-------------------|
| 17. 1,176 by 49. | 24. 5,292 by 42. |
| 18. 2,756 by 52. | 25. 6,075 by 45. |
| 19. 1,352 by 26. | 26. 6,348 by 46. |
| 20. 1,458 by 27. | 27. 8,427 by 53. |
| 21. 2,738 by 74. | 28. 9,075 by 55. |
| 22. 4,332 by 38. | 29. 12,288 by 64. |
| 23. 4,563 by 39. | 30. 17,956 by 67. |

31. A farm was sold for \$ 1,950 at \$ 26 an acre. How many acres were in the farm ?

32. A train travels 1,088 mi. at the rate of 32 mi. an hour. How many hours does it take to perform the journey ?

33. A number of cattle were sold for \$ 1,221 at the rate of \$ 37 a head. How many cattle were sold ?

34. How many mowers at \$ 42 each can be bought for \$ 1,890 ?

35. How many farm wagons at \$ 52 each can be bought for \$ 1,352 ?

36. How many buggies at \$ 75 apiece can be bought for \$ 6,375 ?

37. How many horses at \$ 72 a head can be bought for \$ 2,592 ?

38. A dealer bought 24 sets of furniture for \$ 2,208. Find the cost of one set of furniture.

39. How many yards are in 1,728 in. ?

40. If 7,200 oranges are put up in 75 boxes, how many oranges are in a box ?

41. Choice alfalfa hay sells at \$18 a ton. How many tons can be bought for \$648?

42. An electric light company pays \$4,624 for poles at \$34 apiece. How many poles does the company buy?

43. A hardware company buys a carload of heating stoves for \$1,445 at \$17 apiece. How many stoves in the carload?

44. A trader sells 48 mules for \$4,608. What is the average price of a mule?

45. A farmer sells 69 A. of land for \$1,587. Find the price per acre.

If we divide 0 by 3 the answer is naught. For if we think a moment we can see that there are *no* 3's in 0. That is, $0 \div 3 = 0$.

So, if we divide 0 by any number, we still have 0.

NOTE TO TEACHER. This property of zero should be talked over in class. Use familiar illustrations (such as an *empty* box) to fix this property in the mind of the pupil.

Divide 194,880 by 96.

2030	96 is contained in 194 thousand, 2
96)194880	thousand times. Draw a line above
192	the dividend. Write 2 directly above
<hr/> 288	the 4; that is, in the thousands' place.
288	Multiply the divisor, 96, by 2, and
<hr/> 0	subtract the product, 192 thousand,

from 194 thousand. Bring down the next figure in the dividend, 8. 96 is not contained in 28. Write

0 in the quotient and bring down the next figure, 8. 96 is contained in 288 tens 3 tens times. Write 3 in the tens' place of the quotient. Multiply the divisor by 3 and subtract the product from 288 tens. Bring down the next figure of the dividend, 0. 96 into 0 goes 0 times. Write 0 in the units' place of the quotient. The answer is 2,030.

CHECK: $2,030 \times 96 = 194,880$.

EXERCISE 26 (Written)

Divide:

- | | |
|--------------------|---------------------|
| ✓1. 3,888 by 36. | 17. 41,616 by 204. |
| ✓2. 8,405 by 41. | 18. 93,636 by 306. |
| ✓3. 5,408 by 52. | 19. 166,464 by 408. |
| 4. 5,618 by 53. | 20. 259,081 by 509. |
| 5. 12,544 by 56. | 21. 46,656 by 72. |
| 6. 18,605 by 61. | 22. 56,169 by 79. |
| 7. 31,752 by 63. | 23. 59,536 by 61. |
| 8. 9,248 by 68. | 24. 70,225 by 53. |
| 9. 13,872 by 68. | 25. 87,025 by 59. |
| ✓10. 21,316 by 73. | 26. 133,225 by 73. |
| 11. 36,750 by 35. | 27. 147,456 by 96. |
| 12. 13,467 by 67. | 28. 156,816 by 132. |
| 13. 10,404 by 51. | 29. 158,404 by 199. |
| 14. 11,664 by 54. | 30. 181,476 by 142. |
| 15. 31,827 by 103. | 31. 219,024 by 156. |
| 16. 82,418 by 203. | 32. 239,121 by 163. |

Divide 340 by 10.

$$\begin{array}{r} 10 \overline{)340} \\ 34 \end{array}$$

Divide 784 by 10.

$$\begin{array}{r} 10 \overline{)784} \\ 78, \text{ remainder } 4. \end{array}$$

To divide by 10, take away the units' figure from the dividend. The number indicated by the figure or figures left will be the quotient, and the units' figure taken away will be the remainder.

EXERCISE 27 (Oral or Written)

- | | |
|--------------------------|-----------------------------|
| 1. $300 \div 10 = ?$ | 16. $2,785 \div 10 = ?$ |
| 2. $500 \div 10 = ?$ | 17. $9,415 \div 10 = ?$ |
| 3. $700 \div 10 = ?$ | 18. $10,290 \div 10 = ?$ |
| 4. $900 \div 10 = ?$ | 19. $12,984 \div 10 = ?$ |
| 5. $1,000 \div 10 = ?$ | 20. $23,998 \div 10 = ?$ |
| 6. $6,000 \div 10 = ?$ | 21. $57,819 \div 10 = ?$ |
| 7. $9,000 \div 10 = ?$ | 22. $84,520 \div 10 = ?$ |
| 8. $10,000 \div 10 = ?$ | 23. $75,773 \div 10 = ?$ |
| 9. $12,500 \div 10 = ?$ | 24. $100,284 \div 10 = ?$ |
| 10. $20,590 \div 10 = ?$ | 25. $150,553 \div 10 = ?$ |
| 11. $324 \div 10 = ?$ | 26. $784,750 \div 10 = ?$ |
| 12. $586 \div 10 = ?$ | 27. $1,500,500 \div 10 = ?$ |
| 13. $793 \div 10 = ?$ | 28. $2,200,002 \div 10 = ?$ |
| 14. $1,010 \div 10 = ?$ | 29. $7,700,403 \div 10 = ?$ |
| 15. $1,415 \div 10 = ?$ | 30. $8,211,314 \div 10 = ?$ |

Divide 800 by 100.

$$\begin{array}{r} 100 \overline{)800} \\ 8 \end{array}$$

Divide 7,890 by 100.

$$\begin{array}{r} 100 \overline{)7890} \end{array}$$

78, remainder 90.

7,890 may be read as 78 hundred and 90; hence, the quotient obtained by dividing 7,890 by 100 is 78, with a remainder of 90.

To divide a number by 100, take away the two right hand figures of the dividend. The number indicated by the figure or figures left will be the quotient, and the number taken away will be the remainder.

EXERCISE 28 (Oral or Written)

- | | |
|---------------------------|--------------------------|
| 1. $600 \div 100 = ?$ | 13. $925 \div 100 = ?$ |
| 2. $700 \div 100 = ?$ | 14. $863 \div 100 = ?$ |
| 3. $800 \div 100 = ?$ | 15. $768 \div 100 = ?$ |
| 4. $900 \div 100 = ?$ | 16. $679 \div 100 = ?$ |
| 5. $1,000 \div 100 = ?$ | 17. $739 \div 100 = ?$ |
| 6. $2,000 \div 100 = ?$ | 18. $694 \div 100 = ?$ |
| 7. $3,000 \div 100 = ?$ | 19. $327 \div 100 = ?$ |
| 8. $5,000 \div 100 = ?$ | 20. $967 \div 100 = ?$ |
| 9. $7,000 \div 100 = ?$ | 21. $589 \div 100 = ?$ |
| 10. $9,000 \div 100 = ?$ | 22. $765 \div 100 = ?$ |
| 11. $10,000 \div 100 = ?$ | 23. $9,245 \div 100 = ?$ |
| 12. $584 \div 100 = ?$ | 24. $8,567 \div 100 = ?$ |

25. $10,234 \div 100 = ?$ 29. $6,923,482 \div 100 = ?$
 26. $13,987 \div 100 = ?$ 30. $13,629,584 \div 100 = ?$
 27. $87,456 \div 100 = ?$ 31. $43,756,470 \div 100 = ?$
 28. $2,935,567 \div 100 = ?$ 32. $54,786,260 \div 100 = ?$
 33. $65,987,234 \div 100 = ?$

Divide 17,294 by 1,000.

$$\begin{array}{r} 1000 \overline{)17294} \\ 17, \text{ remainder } 294. \end{array}$$

To divide a number by 1000, take away the three right hand figures of the dividend. The number indicated by the figure or figures left will be the quotient, and the number taken away will be the remainder.

EXERCISE 29 (Oral or Written)

- | | |
|---------------------------------|----------------------------|
| 1. $5,280 \div 1,000 = ?$ | 5. $47,218 \div 1,000 = ?$ |
| 2. $6,890 \div 1,000 = ?$ | 6. $94,530 \div 1,000 = ?$ |
| 3. $12,387 \div 1,000 = ?$ | 7. $75,346 \div 1,000 = ?$ |
| 4. $15,215 \div 1,000 = ?$ | 8. $95,876 \div 1,000 = ?$ |
| 9. $1,432,657 \div 1,000 = ?$ | |
| 10. $4,234,632 \div 1,000 = ?$ | |
| 11. $8,234,982 \div 1,000 = ?$ | |
| 12. $9,235,543 \div 1,000 = ?$ | |
| 13. $6,965,276 \div 1,000 = ?$ | |
| 14. $8,293,847 \div 1,000 = ?$ | |
| 15. $8,268,495 \div 1,000 = ?$ | |
| 16. $23,657,395 \div 1,000 = ?$ | |

17. $12,346,845 \div 1,000 = ?$

18. $32,345,768 \div 1,000 = ?$

19. $23,987,234 \div 1,000 = ?$

20. $56,252,926 \div 1,000 = ?$

21. $45,456,876 \div 1,000 = ?$

22. $23,765,234 \div 1,000 = ?$

23. $19,295,478 \div 1,000 = ?$

24. $23,432,567 \div 1,000 = ?$

UNITED STATES MONEY

$$\$1 = 100\text{¢}$$

How many cents in \$2? In \$3? In \$4? In \$5? In \$8? In \$10?

How many cents in $\$ \frac{1}{2}$? In $\$ \frac{1}{4}$?

How many cents in 1 dime? In 2 dimes? In 3 dimes? In 5 dimes?

How many cents in 8 dimes?

How many dimes in \$1? In \$2? In \$3? In \$5? In \$8?

What part of \$1 is 20¢? 25¢? 50¢?

NOTATION

100¢ is written \$1.00, and is read, one dollar.

101¢ is written \$1.01, and is read, one dollar and one cent.

102¢ is written \$1.02, and is read, one dollar and two cents.

103¢ is written \$1.03, and is read, one dollar and three cents.

110 ¢ is written \$ 1.10, and is read, one dollar and ten cents.

111 ¢ is written \$ 1.11, and is read, one dollar and eleven cents.

115 ¢ is written \$ 1.15, and is read, one dollar and fifteen cents.

120 ¢ is written \$ 1.20, and is read, one dollar and twenty cents.

125 ¢ is written \$ 1.25, and is read, one dollar and twenty-five cents.

130 ¢ is written \$ 1.30, and is read, one dollar and thirty cents.

140 ¢ is written \$ 1.40, and is read, one dollar and forty cents.

150 ¢ is written \$ 1.50, and is read, one dollar and fifty cents.

160 ¢ is written \$ 1.60, and is read, one dollar and sixty cents.

175 ¢ is written \$ 1.75, and is read, one dollar and seventy-five cents.

195 ¢ is written \$ 1.95, and is read, one dollar and ninety-five cents.

200 ¢ is written \$ 2.00, and is read, two dollars.

205 ¢ is written \$ 2.05, and is read, two dollars and five cents.

210 ¢ is written \$ 2.10, and is read, two dollars and ten cents.

225 ¢ is written \$ 2.25, and is read, two dollars and twenty-five cents.

The period between dollars and cents is called the **decimal point**.

The sign \$ is called the **dollar mark**.

Change 342¢ to dollars and cents.

Since there are 100¢ in one dollar, we find how many times 100¢ is contained in 342¢.

By our rule for dividing by 100, we find that the quotient is 3 and the remainder is 42. Hence, 342¢ = \$ 3.42.

Notice that \$3.42 contains the same figures we had to start with, except that we have put a dollar mark in front of the number, and put a decimal point in front of the two right hand figures. We have then our rule for changing cents to dollars and cents.

Write a dollar mark before the number and put a decimal point before the tens' figure in the number.

Placing a decimal point between the figures of a number is called **pointing off**.

EXERCISE 30 (Oral)

Change to dollars and cents:

- | | | | |
|-------------|-------------|-------------|------------|
| 1. 145¢ | 4. 980¢ | 7. 1,225¢ | 10. 2,180¢ |
| 2. 384¢ | 5. 1,250¢ | 8. 1,832¢ | 11. 2,295¢ |
| 3. 796¢ | 6. 1,175¢ | 9. 2,000¢ | 12. 2,618¢ |
| 13. 3,250¢ | 17. 11,400¢ | 21. 18,520¢ | |
| 14. 4,490¢ | 18. 12,790¢ | 22. 20,000¢ | |
| 15. 5,555¢ | 19. 12,500¢ | 23. 25,000¢ | |
| 16. 10,000¢ | 20. 13,575¢ | 24. 24,200¢ | |

EXERCISE 31 (Oral)

Change to cents:

1. \$ 2.75	15. \$ 45.71	29. \$ 985.85
2. \$ 3.25	16. \$ 50.00	30. \$ 1,000.00
3. \$ 5.75	17. \$ 75.50	31. \$ 1,200.00
4. \$ 7.50	18. \$ 80.54	32. \$ 1,234.00
5. \$ 9.45	19. \$ 90.85	33. \$ 1,456.75
6. \$ 9.75	20. \$ 100.00	34. \$ 2,457.98
7. \$ 10.00	21. \$ 101.01	35. \$ 3,789.95
8. \$ 10.75	22. \$ 345.98	36. \$ 4,765.78
9. \$ 15.85	23. \$ 450.98	37. \$ 8,985.95
10. \$ 19.85	24. \$ 500.01	38. \$ 12,975.42
11. \$ 23.60	25. \$ 567.92	39. \$ 29,478.69
12. \$ 25.00	26. \$ 700.75	40. \$ 105,568.65
13. \$ 25.95	27. \$ 801.11	41. \$ 750,897.59
14. \$ 43.89	28. \$ 907.10	42. \$ 978,450 65
	43. \$ 1,000,000.00	

ADDITION

Add:

25¢	\$ 0.25	Example (ii) is the same as Example (i), but is written in a different way. In the first example the amounts to be added are expressed as cents. These are added
64	0.64	
(i) 75	(ii) 0.75	
90	0.90	
85	0.85	
<hr/>		
339¢ = \$ 3.39	\$ 3.39	

and then the answer is divided by 100.

In the second example, the same amounts are expressed as parts of dollars. When these are added, we get the answer as we did in (i), without having to point off; for the amounts in (ii) are already expressed in dollars, and parts of a dollar.

In adding dollars and cents, write the numbers denoting the dollars and cents so that the decimal points are in the same vertical line, then add as in simple addition, placing the decimal point of the sum in the column with the decimal points in the numbers added.

EXERCISE 32 (Written)**Add:**

(1)	(2)	(3)	(4)
\$ 1.25	\$ 7.90	\$ 8.90	\$ 9.67
2.50	8.67	5.00	7.70
3.10	2.90	7.80	10.67
3.98	5.87	9.90	57.90
<u>5.75</u>	<u>4.98</u>	<u>8.70</u>	<u>87.10</u>

(5)	(6)	(7)	(8)
\$ 119.65	\$ 567.56	\$ 456.98	\$ 678.67
234.98	234.98	678.23	697.25
567.45	768.34	987.45	532.85
567.87	769.60	879.65	989.90
987.54	564.23	872.67	769.10
923.89	999.99	777.58	650.80
<u>643.70</u>	<u>342.91</u>	<u>654.90</u>	<u>659.15</u>

(9)	(10)	(11)
\$ 4,265.87	\$ 2,567.10	\$ 295.87
2,564.98	4,532.98	287.98
9,238.45	9,498.50	5,456.90
7,987.45	9,234.76	6,789.80
4,985.45	4,389.60	8,769.95
6,546.91	5,478.10	9,283.85
8,562.19	6,239.75	2,345.25
<u>56,787.90</u>	<u>5,498.75</u>	<u>5,678.25</u>
(12)	(13)	(14)
\$ 2,456.98	\$ 2,396.96	\$ 5,239.98
7,678.75	7,239.75	6,234.75
69,875.90	6,985.50	54,426.90
53,982.16	7,123.95	75,452.25
23,456.25	8,295.25	95,275.65
76,987.57	9,265.65	23,245.96
54,876.56	5,789.98	76,238.65
345,789.98	67,879.56	567,238.54
<u>567,296.65</u>	<u>65,295.52</u>	<u>875,287.65</u>
(15)	(16)	(17)
\$ 4,236.89	\$ 109,108.01	\$ 207,017.09
5,987.50	909,509.80	765,907.07
56,785.10	760,950.95	545,245.55
25,246.50	955,235.65	965,950.85
67,872.19	235,555.75	755,456.34
56,294.87	986,956.52	957,235.45
56,239.65	555,265.25	525,875.35
<u>657,297.75</u>	<u>572,875.95</u>	<u>980,001.75</u>

(18)	(19)	(20)
\$ 707,406.05	\$ 23,000.00	\$ 654,009.10
940,940.90	75,565.95	985,901.90
750,969.85	95,234.90	875,545.55
965,765.68	78,945.35	955,432.25
750,234.75	95,275.50	750,875.50
5,557,235.56	55,259.25	565,245.75
2,359,395.25	96,294.45	890,008.00
<u>5,247,987.90</u>	<u>23,468.59</u>	<u>265,295.60</u>

EXERCISE 33 (Written)

1. A merchant's sales for a week were as follows:

Monday	\$ 215.75
Tuesday	275.85
Wednesday	286.30
Thursday	279.10
Friday	300.00
Saturday	497.98

Find the total sales.

2. The value of barley produced in five New England states in the year 1898 was as follows: Maine, \$183,087.75; New Hampshire, \$66,990.50; Vermont, \$250,120.50; Massachusetts, \$27,683.00; Rhode Island, \$5,431.00. Find the total value of the barley produced in these five states.

3. A Texas farmer sold, during the year, wheat to the value of \$497.85; cotton, \$655.75; hogs, \$385.75; poultry, \$132.10; cattle, \$347.90. Find the amount of his sales.

4. The value of the principal crops in the state of Connecticut for the year 1898 was as follows: Corn, \$862,047.75; wheat, \$5,280.25; oats, \$202,522.50; rye, \$155,433.50; buckwheat, \$36,824.60; potatoes, \$1,391,995.40; hay, \$6,876,361.00. Find the total value of these crops.

5. In furnishing her house a lady bought the following articles at a furniture store at the prices indicated: Parlor set, \$237.75; three bedroom sets for \$175.90; dining room furniture, \$185.00; articles for the kitchen, \$50.50; two bookcases for \$57.75, and a hat-rack for \$17.00. Find the amount of the lady's bill.

6. A traveling man's expenses were, in January, \$120.50; in February, \$115.70; in March, \$127.75; in April, \$123.50; in May, \$130.90. Find his total expenses for the five months.

7. The school children of the following cities in the state of Rhode Island gave these amounts to rebuild the Galveston schools after the storm of 1900: Pascoag, \$34.75; Newport, \$107.00; Woonsocket, \$110.43; Pawtucket, \$136.47; Providence, \$910.06. Find the total amount given by the school children of these cities to rebuild the schools of Galveston.

8. A man's monthly income from rent of a dwelling house is \$17.50; from rent of a store, \$85.60; from interest on money loaned, \$85.75; from rent of a farm, \$68.50; his regular business pays him

\$185.00 a month. What is his monthly income from all sources?

9. The weekly expenses of a contractor are, for laborers, \$2,700.85; for material, \$9,798.50; for freight charges, \$140.90; for drayage, \$205.80; for a bookkeeper, \$18.75. Find his total expenses.

10. The monthly expenses for the schools of a certain city are as follows: Teachers' salaries, \$7,850.50; janitors' salaries, \$350.75; fuel, \$250.89; stationery, \$128.90; repairs, \$475.75; miscellaneous items, \$34.85. Find the total expenses.

11. For the year 1901-1902 the value of lard exported from the United States was as follows: To the United Kingdom, \$19,019,941.00; to France, \$691,981.75; to Germany, \$16,237,484.90. Find the total value of the lard so exported.

12. The value of silver produced in the principal silver-producing states of the United States in the year ending June 30, 1902, was as follows: Nevada, \$105,734,658.16; Montana, \$22,508,433.34; Colorado, \$25,219,278.97. Find the total value of the silver produced in the states mentioned.

13. The value of silver produced in four other states of the United States in the year ending June 30, 1902, was as follows: Arizona, \$14,217,985.76; California, \$4,560,312.88; Utah, \$20,045,581.69; New Mexico, \$7,554,643.22. Find the total value of the silver produced in the states mentioned.

SUBTRACTION

From \$ 10 take \$ 5.84.

\$ 10.00 Write the subtrahend under the minu-
 5.84 end so that the decimal points are in the
 \$ 4.16 same vertical column; then proceed as in
 simple subtraction, writing the decimal
 point in the remainder in the column with the decimal
 points in the minuend and subtrahend.

EXERCISE 34 (Written)

(1)	(2)	(3)	(4)	(5)	(6)
\$ 8.85	\$ 9.50	\$ 7.85	\$ 7.90	\$ 5.80	\$ 8.10
<u>6.09</u>	<u>7.90</u>	<u>4.97</u>	<u>5.75</u>	<u>4.95</u>	<u>3.79</u>
(7)	(8)	(9)	(10)	(11)	(12)
\$ 6.10	\$ 25.50	\$ 35.95	\$ 45.75	\$ 55.10	\$ 75.90
<u>2.60</u>	<u>15.90</u>	<u>24.80</u>	<u>32.95</u>	<u>34.79</u>	<u>55.67</u>
(13)	(14)	(15)	(16)	(17)	
\$ 89.90	\$ 99.90	\$ 123.98	\$ 234.56	\$ 435.98	
<u>56.67</u>	<u>78.98</u>	<u>67.87</u>	<u>210.90</u>	<u>234.56</u>	
(18)	(19)	(20)	(21)	(22)	
\$ 654.20	\$ 876.98	\$ 987.90	\$ 999.90	\$ 567.98	
<u>345.89</u>	<u>654.45</u>	<u>654.89</u>	<u>598.99</u>	<u>345.90</u>	
(23)	(24)	(25)	(26)		
\$ 987.90	\$ 1,543.89	\$ 2,346.87	\$ 3,876.89		
<u>678.99</u>	<u>1,347.88</u>	<u>2,123.50</u>	<u>2,145.85</u>		

(27)	(28)	(29)	(30)
\$ 5,234.75	\$ 3,456.78	\$ 7,286.89	\$ 8,297.45
<u>2,389.90</u>	<u>2,326.90</u>	<u>5,987.56</u>	<u>7,927.80</u>
(31)	(32)	(33)	(34)
\$ 9,296.89	\$ 9,496.50	\$ 11,459.90	\$ 45,278.95
<u>5,285.75</u>	<u>7,897.67</u>	<u>8,987.80</u>	<u>25,876.85</u>
(35)	(36)	(37)	(38)
\$ 56,987.98	\$ 98,876.45	\$ 99,785.25	\$ 234,765.50
<u>43,237.99</u>	<u>56,295.65</u>	<u>49,597.67</u>	<u>221,987.75</u>
(39)	(40)	(41)	
\$ 234,492.56	\$ 678,987.98	\$ 982,679.65	
<u>198,569.89</u>	<u>200,909.09</u>	<u>205,019.98</u>	
(42)	(43)	(44)	
\$ 786,987.90	\$ 2,368,987.99	\$ 5,678,987.85	
<u>409,098.97</u>	<u>2,111,998.91</u>	<u>3,799,899.97</u>	
(45)	(46)	(47)	
\$ 7,234,983.56	\$ 8,987,234.21	\$ 9,234,987.25	
<u>4,445,789.75</u>	<u>7,875,436.40</u>	<u>7,445,999.45</u>	

48. A man has two ten-dollar bills and pays a bill of fifteen dollars. How much change should he get?

49. If a man has five five-dollar bills and buys a barrel of flour for \$ 6.50, how much money will he then have?

50. If a man has a fifty-dollar bill and buys a suit of clothes for \$ 15.50, how much money will he then have?

51. A merchant has \$150.75 in bank and draws out \$75.75. How much money will he have after drawing out this amount?

52. If a clerk's salary is \$50.00 a month, how much money will he have at the end of the month after paying his board bill amounting to \$18.00, and buying a pair of shoes for \$3.50?

Receipts means the amount of money taken in.

Surplus means the amount left over. Thus, if I have 18 cents and owe 16 cents, I have a surplus of 2 cents.

Remit means send.

53. The receipts of a certain post-office for the year 1902 were \$132,552.01; the expenses of the same post-office were \$39,800.61. The surplus was remitted to the United States Treasury. How much money was remitted?

54. The receipts of the same post-office for the year 1901 were \$100,419.88. Find the increase in the receipts of 1902 over 1901.

55. The amount of capital invested in Southern manufactures, in 1860, was \$95,000,000. The amount of capital invested in Southern manufactures, in 1900, was \$787,000,000. Find the increase in the 40 years.

56. The value of cotton seed oil exported from a certain Gulf port in 1902 was \$1,244,677.50. The value of the cotton seed oil exported from the same

port in 1901 was \$1,502,307. Find the decrease in the value of cotton seed oil exported from this port.

57. The Custom House receipts of a certain city for the year 1902 were \$263,508.25. The Custom House receipts of the same city for the year 1901 were \$169,064.41. Find the increase.

58. The value of the lumber exported from Galveston in the year 1902 was \$523,302. The value of the lumber exported from Galveston in the year 1901 was \$479,457.25. Find the increase.

59. An agent sells wheat to the amount of \$2,475, and charges \$70.50 for his services. How much money does he remit to the man for whom he sold the wheat?

60. A lawyer collects a debt amounting to \$1,207.25 and charges \$62.75 for collecting. How much does he remit to the person to whom the debt is due?

61. A property owner employs an agent to collect his rents, amounting to \$750.20. If the agent charges \$45.75 for collecting, how much does the property owner receive?

62. Henry Jones has property valued at \$2,000, and owes James Smith \$150.70 and John Williams \$225. How much is Henry Jones worth?

63. Mr. John Higgins has \$3,750 in one bank and \$1,218.75, in another; he buys a home for \$2,559. How much money has Mr. Higgins left after paying for his home?

64. A land speculator bought a tract of land for \$4,500; he spent in fencing and improving it \$235.75 and then sold it for \$5,000. How much did he make on his speculation?

65. Mr. William Plant buys a house for \$2,400; he paints it and makes other improvements at an expense of \$179.40; he then sells the house for \$2,950. Find his gain.

MULTIPLICATION

Find the cost of 6 pairs of shoes at \$3.50 a pair.

The work is performed as in the multiplication of simple numbers. Multiply each figure of the multiplicand by the multiplier, writing the units' figure of each partial product directly under the figure of the multiplicand producing it. The decimal point in the product is written in the same vertical column with the decimal point of the multiplicand.

EXERCISE 35 (Written)

Multiply by 6:

1. \$5.50; \$7.50; \$17.50; \$25.75; \$36.85;
\$90.40; \$100.68.

Multiply by 7:

2. \$8.50; \$9.75; \$15.75; \$20.82; \$18.90;
\$19.95; \$78.75; \$118.67.

Multiply by 8:

3. \$9.80; \$10.60; \$16.25; \$12.50; \$37.50;
\$87.88; \$92.95; \$118.55.

Multiply by 9 :

4. \$14.50; \$19.80; \$27.75; \$34.89; \$85.95;
\$115.50; \$111.17; \$130.76.

Multiply by 5 :

5. \$16.89; \$18.97; \$27.83; \$39.87; \$89.65;
\$119.93; \$158.57; \$175.79.

6. A farmer bought 9 sheep at \$5.75 a head.
What did he pay for them?

7. A farmer sold 9 horses at \$85.75 each. How
much did he get for the horses?

8. A grocer bought 9 bbl. of flour at \$6.67 a
barrel? What did the flour cost?

9. A man bought 8 A. of land at \$45.50 an acre.
What did the land cost?

Multiply \$48.54 by 46.

$$\begin{array}{r} \$ \quad 48.54 \\ \quad \cdot 46 \\ \hline \text{(i)} \quad 29124 \\ \quad 19416 \\ \hline \$ 2232.84 \end{array}$$

$$\begin{array}{r} 4854\phi \\ \quad 46 \\ \hline \text{(ii)} \quad 29124 \\ \quad 19416 \\ \hline 223284\phi \end{array}$$

The multiplicand in examples (i) and (ii) is the same sum of money; in (i) it is expressed in dollars and cents and in (ii) as cents. 4854¢ multiplied by 46 gives for product 223284¢, or \$2232.84. To multiply dollars and cents by any whole number, proceed as in multiplication of simple numbers, and beginning at right of product, point off two places for cents, and then write the dollar sign (\$) before the result.

EXERCISE 36 (Written)

Multiply:

- | | |
|---------------------|-------------------------|
| 1. \$ 15.50 by 23. | 19. \$ 112.50 by 77. |
| 2. \$ 16.80 by 24. | 20. \$ 150.75 by 84. |
| 3. \$ 18.50 by 25. | 21. \$ 110.38 by 85. |
| 4. \$ 30.20 by 28. | 22. \$ 129.54 by 88. |
| 5. \$ 40.80 by 32. | 23. \$ 125.75 by 90. |
| 6. \$ 36.70 by 36. | 24. \$ 115.64 by 96. |
| 7. \$ 53.90 by 35. | 25. \$ 190.90 by 76. |
| 8. \$ 67.45 by 40. | 26. \$ 128.75 by 67. |
| 9. \$ 80.25 by 42. | 27. \$ 219.83 by 57. |
| 10. \$ 94.68 by 48. | 28. \$ 439.37 by 76. |
| 11. \$ 73.25 by 49. | 29. \$ 227.37 by 67. |
| 12. \$ 82.50 by 50. | 30. \$ 543.10 by 86. |
| 13. \$ 91.35 by 54. | 31. \$ 543.85 by 95. |
| 14. \$ 83.78 by 56. | 32. \$ 765.95 by 59. |
| 15. \$ 73.75 by 60. | 33. \$ 546.75 by 47. |
| 16. \$ 84.87 by 64. | 34. \$ 459.99 by 99. |
| 17. \$ 87.50 by 68. | 35. \$ 258.92 by 66. |
| 18. \$ 96.18 by 72. | 36. \$ 1,234.75 by 105. |
37. What will 9 bu. of wheat cost at 84¢ a bushel?
38. Find the cost of 8 round bales of cotton at \$ 19.82 a bale.
39. What will 9 sacks of flour cost at \$ 3.15 a sack?
40. What will 28 bu. of wheat cost at 75¢ a bushel?

41. What will 25 bbl. (barrels) of cotton seed oil bring at \$18.75 a barrel?

42. Find the cost of 18 sacks of cotton seed meal at \$1.80 a sack.

43. Find the cost of 28 sacks of cotton seed cake at \$2.95 a sack.

44. A hardware merchant bought 28 heating stoves at \$8.75 apiece. What was the total amount he paid for stoves?

45. The same merchant bought 34 gasoline ranges at \$15.60 apiece. What was the total amount he paid for ranges?

46. A farmer sold 25 head of cattle at \$37.50 a head. What was the total amount he received for his cattle?

47. A trader sold 75 mules at \$68.75 each. What was the total amount he received for his mules?

48. What will 100 bu. of wheat cost at 79¢ a bushel?

49. A man sells 115 bbl. of apples at \$1.75 a barrel. How much does the man get for his apples?

50. What will 100 bu. of potatoes cost at 85¢ a bushel?

51. A man sells 18 T. of hay at \$11.25 a ton. How much does he get for his hay?

52. What will 17 doz. chickens cost at \$3.25 a dozen?

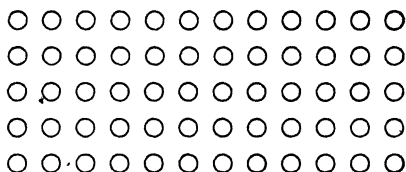
53. Find the cost of 84 T. of coal at \$ 7.60 a ton.

54. Gold is worth \$ 20.67 an ounce. What is the value of a bar of gold weighing 32 oz. ?

FACTORS

Multiply 12 by 5.

$$\begin{array}{r} 12 \\ 5 \\ \hline 60 \end{array}$$



Write five rows of \bigcirc 's with twelve \bigcirc 's in each row ; this gives 5 times 12 \bigcirc 's or 60 \bigcirc 's. In each vertical row there are 5 \bigcirc 's ; counting the \bigcirc 's in this way we have 12 times 5 \bigcirc 's, or 60 \bigcirc 's. Hence, 12 times 5 = 5 times 12.

By taking any other two numbers we can show in a similar manner that their product is the same no matter which number is taken as multiplier and which as multiplicand.

$5 \times 9 \times 11 = ?$ This means that 5 is to be multiplied by 9, and their product by 11.

$$11 \times 5 \times 9 = ?$$

$$9 \times 11 \times 5 = ?$$

The continued product of several numbers is the same no matter in what order the numbers are written.

Two or more numbers multiplied together are

called **factors** of their product. Thus, 9, 11, and 5 are factors of 495.

A farmer sold four bales of cotton, weighing 475 lb., 492 lb., 480 lb., and 498 lb., at 8¢ a pound. How much did he receive for his four bales of cotton?

475 lb.	First, find the number
492 lb.	of pounds sold; second,
480 lb.	multiply the price of 1 lb.
498 lb.	by the number of pounds.
1945 lb.	To multiply 8 by 1,945
8	gives the same result as
15560	to multiply 1,945 by 8.
Ans. \$155.60	We can, therefore, make

1,945 the multiplicand and 8 the multiplier. The resulting product will be the number of cents which the cotton brings.

EXERCISE 37 (Written)

1. Find the price of 3 bales of cotton, weighing 500 lb., 492 lb., and 512 lb., at 7¢ a pound.

2. A farmer sold 4 round bales of cotton, weighing 238 lb., 244 lb., 240 lb., and 242 lb., at 7¢ a pound. What did he receive for his cotton?

3. A ship's cargo contained 233,123 lb. of cotton valued at 8¢ a pound. What was the value of the cargo?

4. A ship's cargo contained 184,000 bu. of wheat valued at 72¢ a bushel. Find the value of the cargo.

5. The British steamship *Irada* cleared the port of Galveston Sept. 30, 1902, with a cargo of cotton weighing 8,660,717 lb. Cotton was then worth 8¢ a pound. What was the value of the *Irada's* cargo of cotton?

6. The British steamship *Atlantian* cleared the port of Galveston Oct. 10, 1902, with a cargo containing 18,261 square bales of cotton weighing 9,678,330, and 5,000 round bales of cotton weighing 1,200,000 lb. Find the value of the cotton at 8¢ a pound.

7. The same steamship carried 2,707 sacks of cottonseed meal valued at \$1.15 a sack. Find the value of the cottonseed meal in her cargo.

8. Find the value of 4,480 sacks of cottonseed meal at \$1.16 a sack.

9. The British steamship *Mount Temple* cleared the port of Galveston Dec. 8, 1902, with 16,400 square bales and 18,400 round bales of cotton, both weighing 12,986,400 lb. Find the value of the cargo of cotton at 8¢ a pound.

10. Find the value of 17,838 sacks of cottonseed meal at \$1.15 a sack.

11. Find the cost of 1,580 bu. of oats at 43¢ a bushel.

12. Find the value of 240 boxes of oranges at \$1.75 a box.

13. A farmer sold 245 bbl. of apples at \$1.85 a barrel. What was the total amount he received for his apples?

14. A butcher sold 1,872 lb. of beef at 11¢ a pound. What was the total amount he received for the beef?

15. A dealer sold 15,780 lb. of pork at 7¢ a pound. What was the total amount he received for the pork?

16. A bookseller bought 115 geographies at 45¢ apiece. What was the value of his purchase?

17. The same bookseller bought 237 readers at 35¢ each. How much did he pay for the readers? If he sold these readers for 42¢ each, what was his profit?

18. A clothier buys 150 straw hats at 90¢ each, and sells them at \$1.30 each. How much does he make?

DIVISION

$$(i) \quad \begin{array}{r} 5 \overline{)1175\text{¢}} \\ 235\text{¢} \end{array} \qquad (ii) \quad \begin{array}{r} 5 \overline{)\$11.75} \\ \$2.35 \end{array}$$

The dividends in examples (i) and (ii) are the same sum of money; in (i) it is expressed in cents, and in (ii) as dollars and cents. The answer to (i) is of the same value as the answer to (ii).

To divide dollars and cents by any number, proceed as in division of simple numbers; from the right of the quotient, point off two places for cents, and then write the dollar sign before the quotient.

EXERCISE 38 (Written)

Divide by 4:

1. \$ 8.36; \$ 7.68; \$ 11.24; \$ 19.76; \$ 21.84;
\$ 27.64; \$ 33.16; \$ 35.72.

Divide by 5:

2. \$ 16.20; \$ 17.85; \$ 19.95; \$ 22.65; \$ 27.10;
\$ 32.35; \$ 39.80; \$ 37.85.

Divide by 6:

3. \$ 12.42; \$ 15.66; \$ 17.76; \$ 21.90; \$ 32.70;
\$ 33.84; \$ 39.24; \$ 41.04.

Divide by 7:

4. \$ 17.50; \$ 21.84; \$ 25.62; \$ 29.12; \$ 31.57;
\$ 37.94; \$ 48.96; \$ 57.54.

Divide by 8:

5. \$ 12.64; \$ 15.92; \$ 23.84; \$ 26.88; \$ 35.92;
\$ 42.32; \$ 49.12; \$ 59.46.

Divide by 9:

6. \$ 15.93; \$ 18.45; \$ 26.46; \$ 39.71; \$ 47.16;
\$ 64.26; \$ 73.17; \$ 85.59.

7. A man bought 3 pairs of shoes for \$ 10.50.
What was the price of a pair of shoes?

8. If three tons of coal cost \$ 25.50, what will 1
T. cost?

9. If 4 calves are sold for \$ 66.40, what is the
price of each calf?

10. A farmer sells 5 sheep for \$ 33.75. What is
the price of a sheep?

11. If a trader sells 7 mules for \$591.50, what is the average price of these mules?

12. Suppose 8 pianos are sold for \$1,884. Find the average selling price of a piano.

13. When 9 bbl. of flour sell for \$60.75, what is the selling price of 1 bbl.?

14. When 9 bbl. of sugar sell for \$146.25, what is the selling price of 1 bbl.?

15. If 8 rugs cost \$148, what is the average cost of a rug?

16. A real estate agent sells 7 town lots for \$1298.50. Find the average selling price of a lot.

17. A real estate agent sells 6 houses for \$7,503. What is the average selling price of these houses?

18. If 9 doz. chickens cost \$32.85, what did they cost per dozen?

19. 9 bu. of wheat were sold for \$7.56. Find the price of 1 bu.

20. Seven thousand feet of lumber cost \$150.50. Find the price of 1,000 ft. of lumber.

21. A furniture dealer bought 7 dining-room tables, each costing the same amount, for \$194.25. Find the cost of average table.

EXERCISE 39 (Written)

1. $\$992.25 \div 3 = ?$

4. $\$1,049.76 \div 4 = ?$

2. $\$1,361.61 \div 3 = ?$

5. $\$1,211.04 \div 4 = ?$

3. $\$1,568.16 \div 3 = ?$

6. $\$1,584.04 \div 4 = ?$

- | | |
|-------------------------|-------------------------|
| 7. \$ 2,061.16 ÷ 4 = ? | 33. \$ 2,611.21 ÷ 7 = ? |
| 8. \$ 2,323.24 ÷ 4 = ? | 34. \$ 2,830.24 ÷ 7 = ? |
| 9. \$ 2,480.04 ÷ 4 = ? | 35. \$ 3,058.09 ÷ 7 = ? |
| 10. \$ 1,122.25 ÷ 5 = ? | 36. \$ 3,294.76 ÷ 7 = ? |
| 11. \$ 1,260.25 ÷ 5 = ? | 37. \$ 3,540.25 ÷ 7 = ? |
| 12. \$ 1,560.25 ÷ 5 = ? | 38. \$ 3,794.56 ÷ 7 = ? |
| 13. \$ 2,256.25 ÷ 5 = ? | 39. \$ 4,238.01 ÷ 7 = ? |
| 14. \$ 2,450.25 ÷ 5 = ? | 40. \$ 2,381.44 ÷ 8 = ? |
| 15. \$ 2,756.25 ÷ 5 = ? | 41. \$ 2,540.16 ÷ 8 = ? |
| 16. \$ 1,814.76 ÷ 6 = ? | 42. \$ 2,872.96 ÷ 8 = ? |
| 17. \$ 1,971.36 ÷ 6 = ? | 43. \$ 3,047.04 ÷ 8 = ? |
| 18. \$ 2,079.36 ÷ 6 = ? | 44. \$ 3,226.24 ÷ 8 = ? |
| 19. \$ 2,246.76 ÷ 6 = ? | 45. \$ 3,410.56 ÷ 8 = ? |
| 20. \$ 2,480.04 ÷ 6 = ? | 46. \$ 3,504.64 ÷ 8 = ? |
| 21. \$ 2,981.16 ÷ 6 = ? | 47. \$ 3,696.64 ÷ 8 = ? |
| 22. \$ 3,180.96 ÷ 6 = ? | 48. \$ 3,014.01 ÷ 9 = ? |
| 23. \$ 3,528.36 ÷ 6 = ? | 49. \$ 3,214.89 ÷ 9 = ? |
| 24. \$ 3,745.44 ÷ 7 = ? | 50. \$ 3,422.25 ÷ 9 = ? |
| 25. \$ 4,044.96 ÷ 6 = ? | 51. \$ 3,636.09 ÷ 9 = ? |
| 26. \$ 4,199.04 ÷ 6 = ? | 52. \$ 4,316.49 ÷ 9 = ? |
| 27. \$ 1,823.29 ÷ 7 = ? | 53. \$ 4,678.56 ÷ 9 = ? |
| 28. \$ 1,944.81 ÷ 7 = ? | 54. \$ 4,928.04 ÷ 9 = ? |
| 29. \$ 2,070.25 ÷ 7 = ? | 55. \$ 5,314.41 ÷ 9 = ? |
| 30. \$ 2,199.61 ÷ 7 = ? | 56. \$ 5,715.36 ÷ 9 = ? |
| 31. \$ 2,332.89 ÷ 7 = ? | 57. \$ 5,990.76 ÷ 9 = ? |
| 32. \$ 2,470.09 ÷ 7 = ? | 58. \$ 6,272.64 ÷ 9 = ? |

- | | |
|-------------------------|-------------------------|
| 59. \$ 6,707.61 ÷ 9 = ? | 69. \$ 5,715.36 ÷ 7 = ? |
| 60. \$ 7,005.69 ÷ 9 = ? | 70. \$ 5,994.24 ÷ 7 = ? |
| 61. \$ 7,310.25 ÷ 9 = ? | 71. \$ 6,368.04 ÷ 7 = ? |
| 62. \$ 7,779.24 ÷ 9 = ? | 72. \$ 6,593.44 ÷ 7 = ? |
| 63. \$ 8,262.81 ÷ 9 = ? | 73. \$ 6,822.76 ÷ 7 = ? |
| 64. \$ 8,593.29 ÷ 9 = ? | 74. \$ 6,658.56 ÷ 8 = ? |
| 65. \$ 8,930.25 ÷ 9 = ? | 75. \$ 6,922.24 ÷ 8 = ? |
| 66. \$ 9,273.69 ÷ 9 = ? | 76. \$ 7,464.96 ÷ 8 = ? |
| 67. \$ 5,097.96 ÷ 7 = ? | 77. \$ 7,814.56 ÷ 8 = ? |
| 68. \$ 5,299.84 ÷ 7 = ? | 78. \$ 8,537.76 ÷ 8 = ? |

LONG DIVISION

Divide \$ 2,190.24 by 156.

\$ 14.04	Draw a line over the dividend.
156) \$ 2,190.24	The first <i>partial dividend</i> is
1 56	219. 156 is contained in 219
630	1 time. Write the 1 directly
624	over the right-hand figure of
624	the partial dividend. Multiply
624	the divisor by 1 and sub-
	tract the product from 219.

Bring down the next figure, 0. 156 is contained in 630, the next partial dividend, 4 times. Write 4 over the right-hand figure of the partial dividend. Multiply the divisor by 4 and subtract the product from 630. Bring down the next figure, 2. 156 is not contained in 62. Write 0 in the quotient over 2, the figure brought down. Bring down the

next figure, 4. 156 is contained in 624 4 times. Write 4 over the 4 brought down. The decimal point in the quotient is written in the same vertical column with the decimal point in the dividend.

Check. $\$ 14.04 \times 156 = \$ 2,190.24$.

EXERCISE 40 (Written)

Divide:

- | | |
|---------------------|------------------------|
| 1. \$47.61 by 23. | 21. \$316.84 by 89. |
| 2. \$57.76 by 38. | 22. \$345.96 by 93. |
| 3. \$60.84 by 13. | 23. \$416.16 by 68. |
| 4. \$70.56 by 14. | 24. \$432.64 by 52. |
| 5. \$92.16 by 16. | 25. \$449.44 by 53. |
| 6. \$98.01 by 33. | 26. \$453.69 by 71. |
| 7. \$92.16 by 24. | 27. \$510.76 by 113. |
| 8. \$56.25 by 25. | 28. \$3,047.04 by 184. |
| 9. \$148.84 by 61. | 29. \$3,283.29 by 191. |
| 10. \$163.84 by 32. | 30. \$3,457.44 by 196. |
| 11. \$201.64 by 71. | 31. \$3,226.24 by 284. |
| 12. \$216.09 by 49. | 32. \$3,317.76 by 288. |
| 13. \$237.16 by 77. | 33. \$3,387.24 by 291. |
| 14. \$268.96 by 82. | 34. \$3,540.25 by 119. |
| 15. \$295.84 by 43. | 35. \$3,387.24 by 194. |
| 16. \$309.76 by 88. | 36. \$3,696.64 by 304. |
| 17. \$345.96 by 62. | 37. \$3,943.84 by 314. |
| 18. \$368.64 by 64. | 38. \$4,070.44 by 319. |
| 19. \$380.25 by 39. | 39. \$4,160.25 by 215. |
| 20. \$392.04 by 66. | 40. \$4,199.04 by 324. |

AVERAGE

To find the *average* cost of an article, when we know the total cost of a number of articles, we divide total cost by the number of articles. Example: If a man buys a pair of shoes for \$1, another pair for \$2, another pair for \$3, what is the average cost of the shoes a pair?

The total cost of the shoes is $\$1 + \$2 + \$3 = \6 . Since there are three pairs of shoes, we divide \$6 by 3. The answer is \$2. That is, the average price of the shoes is \$2 a pair.

EXERCISE 41 (Written)

1. A commission merchant sold 1,508 bales of cotton for \$56,851.60. Find the average price per bale.

2. A dealer sold 48 farm wagons for \$2,870.40. What was the average selling price of the wagons?

3. A dealer sold 17 horses for \$2,123.30. What was the average price at which the horses were sold?

4. A man sold 273 bbl. of apples for \$745.29. Find the selling price of the apples per barrel.

5. A farmer bought 336 A. of land for \$4,515.84. What did the land cost per acre?

6. A grain merchant sold 25 carloads of wheat for \$5,437.50. What was the average value of one carload?

How many times is \$ 1.45 contained in \$ 36.25 ?

Divisor, \$ 1.45 = 145¢. 25

Dividend, \$ 36.25 = 3625¢. 145)3625

\$ 1.45 is contained in \$ 36.25 as many times as 145¢ is contained in 3625¢, or as many times as the number 145 is contained in the number 3625. The answer is 25 times.

$$\begin{array}{r} 290 \\ \underline{725} \\ 725 \end{array}$$

EXERCISE 42 (Written)

1. How many pairs of shoes at \$ 2.25 a pair can be bought for \$ 9.00 ?

2. How many pounds of sugar at 5¢ a pound can be bought for \$ 1.35 ?

3. How many pounds of tea at 55¢ a pound can be bought for \$ 60.50 ?

4. How many pounds of coffee at 18¢ a pound can be bought for \$ 6.48 ?

5. How many hats at \$ 2.15 apiece can be bought for \$ 27.95 ?

6. If the price of oats is 28¢ a bushel, how many bushels can be bought for \$ 15.68 ?

7. If the price of corn is 48¢ a bushel, how many bushels can be bought for \$ 67.20 ?

8. A clothier bought a number of suits of clothes at \$ 15.50 a suit, and paid \$ 480.50. How many suits did he buy ?

9. A farmer bought a farm for \$ 2,200, paying \$ 27.50 an acre. How many acres in the farm ?

10. A livestock commission merchant paid \$3,120.50 for cattle at \$39.50 a head. How many cattle did he buy?

11. A coal dealer paid \$2,925 for coal at \$6.50 a ton. How many tons did he buy?

How many times is:

12. 14¢ contained in \$7.84?
13. 8¢ contained in \$10.24?
14. 7¢ contained in \$12.25?
15. 9¢ contained in \$12.96?
16. 13¢ contained in \$15.21?
17. 11¢ contained in \$43.56?
18. 12¢ contained in \$51.84?
19. 15¢ contained in \$56.25?
20. 9¢ contained in \$65.61?
21. 8¢ contained in \$100.00?
22. 4¢ contained in \$250.00?
23. 16¢ contained in \$92.16?
24. 7¢ contained in \$96.04?
25. 11¢ contained in \$98.12?
26. 19¢ contained in \$90.44?
27. 23¢ contained in \$84.64?
28. 84¢ contained in \$141.12?
29. 47¢ contained in \$44.18?
30. 56¢ contained in \$125.44?
31. \$1.01 contained in \$918.09?
32. \$1.09 contained in \$594.05?

- 33. \$1.25 contained in \$1,000.00 ?
- 34. \$1.52 contained in \$924.16 ?
- 35. \$1.79 contained in \$1,602.05 ?
- 36. \$2.67 contained in \$1,425.78 ?
- 37. \$2.79 contained in \$2,335.23 ?
- 38. 59¢ contained in \$870.25 ?
- 39. 69¢ contained in \$7,617.60 ?
- 40. 96¢ contained in \$8,880.00 ?
- 41. 13¢ contained in \$9,009.00 ?
- 42. 11¢ contained in \$9,009.00 ?
- 43. \$1.43 contained in \$9,009.00 ?
- 44. \$2.99 contained in \$2,682.03 ?
- 45. \$3.60 contained in \$7,776.00 ?
- 46. \$3.70 contained in \$9,583.00 ?
- 47. \$3.84 contained in \$7,372.80 ?
- 48. \$1.94 contained in \$1,505.44 ?
- 49. \$3.90 contained in \$7,605.00 ?
- 50. \$4.10 contained in \$15,129.00 ?
- 51. \$4.43 contained in \$5,887.47 ?
- 52. \$5.07 contained in \$12,852.45 ?
- 53. \$6.07 contained in \$18,422.45 ?
- 54. 25¢ contained in \$250.00 ?
- 55. 75¢ contained in \$22,500.75 ?
- 56. \$1.50 contained in \$10,500.00 ?
- 57. \$1.75 contained in \$35,000.00 ?

58. \$6.25 contained in \$7,812.50 ?
59. \$6.70 contained in \$22,445.00 ?
60. \$7.07 contained in \$24,992.45 ?
61. \$8.80 contained in \$69,696.00 ?
62. \$1.98 contained in \$9,801.00 ?
63. \$4.83 contained in \$9,331.56 ?

REVIEW

EXERCISE 43 (Written)

1. The amount of sugar produced in the United States in the years from 1907 to 1911, inclusive, was as follows :

1907	.	.	.	.	845,871 tons.
1908	.	.	.	.	1,017,288 tons.
1909	.	.	.	.	1,092,817 tons.
1910	.	.	.	.	1,105,613 tons.
1911	.	.	.	.	1,116,000 tons.

How many tons of sugar were produced in the five years ?

2. How many more tons of sugar were produced in 1908 than in 1907 ?

3. How many more tons of sugar were produced in 1909 than in 1908 ?

4. How many more tons of sugar were produced in 1910 than in 1909 ?

5. How many more tons of sugar were produced in 1911 than in 1910 ?

6. The railroad mileage, at the end of the year 1900, of the countries of Europe was as follows:

Germany	.	.	.	31,933 miles.
Austria	.	.	.	22,917 miles.
Great Britain	.	.	.	21,864 miles.
France	.	.	.	26,611 miles.
Russia	.	.	.	29,892 miles.
Italy	.	.	.	9,810 miles.
Belgium	.	.	.	3,943 miles.
Netherlands	.	.	.	1,994 miles.
Switzerland	.	.	.	2,351 miles.
Spain	.	.	.	8,300 miles.
Portugal	.	.	.	1,476 miles.
Denmark	.	.	.	1,865 miles.
Norway	.	.	.	1,286 miles.
Sweden	.	.	.	7,034 miles.
Servia	.	.	.	359 miles.
Roumania	.	.	.	1,925 miles.
Greece	.	.	.	605 miles.
Turkey	.	.	.	1,952 miles.

Find number of miles of railroad in Europe.

7. The total number of miles of railroad in the United States at the end of the year 1900 was 193,304 mi. How many more miles of railroad were in the United States than in all of Europe?

8. How many more miles of railroad were in the United States than in Germany? Austria? Great Britain? France? Russia?

9. Omaha, Nebraska, is 1,383 mi. distant from New York. A man leaves Omaha for New York City, traveling at the rate of 31 mi. an hour. How far will he be from New York City at the end of 24 hr.?

10. Milwaukee is 85 mi. from Chicago. A man leaves Chicago for Milwaukee on a bicycle, traveling at the rate of 9 mi. an hour. How far will he be from Milwaukee at the end of 6 hr.?

11. Yokohama is 5,140 mi. from San Francisco. A steamer makes the voyage from San Francisco to Yokohama in 374 hr. Find the average rate of the ship per hour.

12. Glasgow is 3,375 mi. from New York City. A steamer makes the voyage between these cities in 9 da. Find the steamer's average rate per hour.

13. The postal distance between New York City and New Orleans is 1,344 mi. The postal time is 40 hr. Find the average rate per hour.

14. The time of mail transit between New York City and St. Louis is 29 hr. The distance is 1,048 mi. Find the average rate of the mail train.

15. A farmer buys 85 A. of land from his neighbor at \$56.50 an acre and sells it to another neighbor at \$60 an acre. How much does he gain?

16. A speculator buys 950 bu. of wheat at 79¢ a bushel, and sells it at 81¢ a bushel. How much does he gain in all?

17. A dry goods merchant buys 150 dress skirts at \$ 6.75 each, and sells them at \$ 8.00 apiece. Find his total profit.

18. A shoe dealer buys 250 pairs of shoes at \$ 1.69 a pair, and sells them at \$ 2.00 a pair. How much profit does he make?

19. A farmer bought 105 sheep at \$ 3.50 a head; he spent for feed for the sheep \$ 112.50, and then sold them at \$ 5.25 a head. How much did he gain?

20. A farmer bought 75 head of cattle at \$ 25 a head; he paid \$ 3.50 a head for 4 months' pasturage; he then sold the cattle for \$ 30.00 a head. How much did he gain in all?

21. If the divisor is 15 and the quotient is 37, what is the dividend?

22. What number must be added to the sum of 324 and 439 to make 1,000?

23. By what number must 36 be multiplied to give for product 2,592?

24. By what number must 686 be divided to give for a quotient 14?

25. An estate is divided among 5 boys, each one getting \$ 712.50. What is the value of the estate?

26. A box of oranges sold for \$ 5. How many oranges were in the box, if each orange brought 2¢?

27. By selling sheep at a profit of \$ 1.50 a head, a man makes a profit of \$ 21.00 in all. How many sheep does he sell?

28. How many tons of hay must I sell at \$10.50 a ton to pay for 200 bu. of wheat at 84¢ a bushel?

The sign @ placed between a number of articles and the number of dollars or cents shows the cost of one article. Thus:

10 cans of paint @ 15¢ is read, 10 cans of paint at 15¢ a can.

BILLS

A bill is a written list of articles sold or of services rendered, giving the price of each, with their total amount.

SPECIMEN BILL

ATLANTA, GA., *May 1, 1903.*

Mr. James Henry,

*In Account with WILLIAM MERCHANT & COMPANY,
WHOLESALE AND RETAIL GROCERS.*

<i>April</i>	<i>3</i>	<i>1 ham, 18 lb.</i>	<i>@ 15¢</i>	<i>\$2</i>	<i>70</i>
"	<i>5</i>	<i>5 doz. cans of tomatoes</i>	<i>@ 95¢</i>	<i>4</i>	<i>75</i>
"	"	<i>17 lb. sugar</i>	<i>@ 5¢</i>		<i>85</i>
"	"	<i>5 lb. tea</i>	<i>@ 60¢</i>	<i>3</i>	<i>00</i>
"	"	<i>10 lb. coffee</i>	<i>@ 30¢</i>	<i>3</i>	<i>00</i>
"	"	<i>5 pk. potatoes</i>	<i>@ 20¢</i>	<i>1</i>	<i>00</i>
"	<i>8</i>	<i>2 sacks flour</i>	<i>@ \$1.50</i>	<i>3</i>	<i>00</i>
"	<i>8</i>	<i>3 doz. cans asparagus</i>	<i>@ 1.65</i>	<i>4</i>	<i>95</i>
"	<i>12</i>	<i>3 packages cream of tartar</i>	<i>@ 25¢</i>		<i>75</i>
"	<i>15</i>	<i>5 lb. mincemeat</i>	<i>@ 30¢</i>	<i>1</i>	<i>50</i>
				<i>\$24</i>	<i>50</i>

May 1, 1903.

Received payment,

William Merchant & Company.

RICHMOND, VA., *March 1, 1903.**Mr. John Wilkins,*

BOUGHT OF THE PEOPLE'S STORE.

Feb.	4	2 parasols	@ 90¢	\$1	80
"	5	3 pairs hose	@ 50¢	1	50
"	"	2 pairs shoes	@ \$3.50	7	00
"	10	2 shirt waists	@ 1.75	3	50
"	15	3 lace curtains	@ 2.50	7	50
"	20	1 skirt	@ 7.50	7	50
"	25	10 yd. bleached domestic	@ 12¢ yd.	1	20
"	27	2 mosquito bars	@ \$3.50	7	00

Copy the above bill, find the amount, and receipt it.

DALLAS, TEXAS, *Sept. 1, 1902.**Mr. Wilbur Smith,*BOUGHT OF
THE NORTH TEXAS HARDWARE COMPANY.

Aug.	17	3 axes	@ \$1.25		
"	"	4 saws	@ 1.35		
"	"	7 hatchets	@ 90¢		
"	20	40 lb. nails	@ 6¢		
"	"	4 doz. door hinges	@ \$1.60		
"	23	3 knives	@ 75¢		
"	25	6 doz. screws	@ 12¢		
"	29	3 razors	@ \$1.50		

Copy, find the amount, and receipt.

WICHITA, KANSAS, *December 1, 1902.**Mr. Oliver Orton,*BOUGHT OF
THE SOUTH KANSAS IMPLEMENT COMPANY.

Nov.	10	2 wagons	@ \$ 65.00		
"	"	3 plows	@ 7.50		
"	"	3 harrows	@ 5.75		
"	15	4 pairs harness	@ 18.50		
"	20	3 robes	@ 6.50		

Thos. Jones,

TO WILLIAM LITTLE, DR.

		5 days' work	@ \$ 3.20		
		10 bbl. flour	@ 8.50		
		50 lb. nails	@ 5 ¢		
		8 pairs hinges	@ 75 ¢ a pair		
		5 locks	@ 90 ¢		

Mr. William Lyle,

BOUGHT OF F. D. STONER & COMPANY.

		20 yd. ingrain carpet	@ 75 ¢		
		40 yd. matting	@ 60 ¢		
		2 chiffoniers	@ \$ 10.50		
		1 extension table	@ 24.50		
		1 center table	@ 3.75		
		4 rocking chairs	@ 6.75		
		1 kitchen safe	@ 7.50		
		1 couch	@ 36.50		
		2 lawn swings	@ 5.75		
		4 iron beds	@ 8.50		

Copy, find amounts, and receipt above bills.

EXERCISE 44

Area means amount of surface.

The Areas of the thirteen original states are :

NAME	WATER AREA	LAND AREA
New Hampshire	300 sq. miles	9,005 sq. miles
Massachusetts	275 sq. miles	8,040 sq. miles
Rhode Island	197 sq. miles	1,053 sq. miles
Connecticut	145 sq. miles	4,845 sq. miles
New York	1,550 sq. miles	47,620 sq. miles
New Jersey	290 sq. miles	7,525 sq. miles
Pennsylvania	230 sq. miles	44,985 sq. miles
Delaware	90 sq. miles	1,960 sq. miles
Maryland	2,350 sq. miles	9,860 sq. miles
Virginia	2,325 sq. miles	40,125 sq. miles
North Carolina	3,670 sq. miles	48,580 sq. miles
South Carolina	400 sq. miles	30,170 sq. miles
Georgia	495 sq. miles	58,980 sq. miles

1. Find the total area of each of the above-mentioned states.

2. Find the total area of water surface of the thirteen original states.

3. How much greater is the land area of these states than the water area?

4. Find the total land area of the thirteen original states.

5. A square mile contains 640 A. Express the land area of New Hampshire in acres.

6. Find the number of acres in the combined water areas of the thirteen original states.

The following table gives the population of the cities named in 1910 and in 1900:

NAME	1910	1900
San Antonio, Texas	96,614	53,321
Manchester, N.H.	70,063	56,987
Evansville, Ind.	69,647	59,007
Springfield, Mass.	88,926	62,059
Oakland, Cal.	150,174	66,960
Bridgeport, Conn.	102,054	70,996
Reading, Pa.	96,071	78,961
Seattle, Wash.	237,194	80,671
Richmond, Va.	127,628	85,050
Portland, Me.	58,571	50,145
Youngstown, Ohio.	79,066	44,885
Brockton, Mass.	56,878	40,036
Tacoma, Wash.	83,743	37,714
Allentown, Pa.	51,913	35,416

6. Find the increase in population in each of the above cities.

7. How far will a train run in 9 hr. at 29 mi. an hour? At 34 mi. an hour? At 37 mi. an hour? At 43 mi. an hour?

8. A bicyclist rides at the rate of 9 mi. an hour. How far will he go in 13 hr.? In 14 hr.?

Find the cost of the following articles:

9. 95 bbl. apples @ \$ 2.30 per barrel.

10. 87 bu. wheat @ 93¢ per bushel.

11. 49 bu. barley @ 76¢ per bushel.

12. 56 bu. oats @ 48¢ per bushel.

13. 19 bu. potatoes @ 97¢ per bushel.
14. 34 bales cotton @ \$47.50 per bale.
15. 24 sacks cottonseed meal @ \$1.82 per sack.
16. 7 sacks of pecans @ \$5.85 per sack.
17. 23 T. hay @ \$15.60 per ton.
18. 16 cords wood @ \$4.80 per cord.
19. 18 boxes oranges @ \$1.85 per box.
20. 37 boxes lemons @ \$2.25 per box.
21. 56 bunches bananas @ 55¢ per bunch.
22. 18 bbl. flour @ \$5.70 per barrel.
23. 25 sacks bran @ \$1.40 per sack.
24. 84 bu. sweet potatoes @ 95¢ per bushel.
25. 28 T. coal @ \$7.70 per ton.
26. An orchard has 26 rows of trees and 58 trees in each row. How many trees are in the orchard?
27. A cornfield has 96 rows of corn, and 583 hills in a row. How many hills are in the field?
28. A boy earns \$3.45 per week. How much will he earn in 21 weeks?
29. What number divided by 8 will give a quotient of 5? Will give a quotient of 19? Will give a quotient of 78?
30. How many shoes are required for 9 span of horses?
31. How many legs have 9 horses?

32. How many times does 8 go into 32? Into 64? Into 96? Into 120?

33. How many times does 25 go into 175? 225? 3,275?

34. Two trains start from the same place and travel in opposite directions at the rates of 18 and 30 miles per hour respectively. How far apart will they be in 8 hr.? In 14 hr.?

35. A stock jobber bought 67 horses at \$94 apiece and sold them at \$115 apiece. What was his total gain?

36. 63 acres of land are bought at \$47 an acre, and sold at \$56 an acre. Find the total gain.

37. How long will it take a man to save \$361, if he saves \$9.50 a week?

38. How long will it take a carrier pigeon to fly 576 mi. at the rate of 48 mi. an hour?

39. How many pairs of shoes can be bought for \$42.00 at \$3.50 a pair?

40. How many lambs can be bought for \$81 at \$2.25 per head?

41. A steamboat runs 13 mi. an hour. How long will it take to run 507 mi.?

42. Find the difference between 63 times 65 and 62 times 66.

43. Find the difference between 76 times 89 and 77 times 88.

44. Find the difference between 96 times 76 and 97 times 75.

45. Express in Roman notation: 44; 76; 88; 113; 129; 147; 200; 325; 555; 666; 1775; 1898.

46. Gates Thomas sold 537 lb. pecans at 5¢ a pound. How much did he receive for the pecans?

47. A certain square has an area of 25 sq. yd. How many yards in one side?

48. A city lot in the form of a square contains 144 sq. yd. Find the length of one side of the square.

49. A floor is 16 ft. by 14 ft. A rug 12 ft. by 14 ft. is placed on it. The remainder of the floor is stained. Find the area of the surface stained. Find the cost of staining it at 5¢ a square foot.

50. $\frac{1}{2}$ of 22 = ? $\frac{1}{3}$ of 39 = ? $\frac{1}{4}$ of 72 = ?

51. $\frac{2}{5}$ of 90 = ? $\frac{5}{6}$ of 144 = ? $\frac{1}{7}$ of 84 = ?

52. $\frac{2}{7}$ of 98 = ? $\frac{2}{9}$ of 153 = ? $\frac{5}{9}$ of 261 = ?

53. Two cows are bought for \$70. Find the price of one of the cows. Find the price of 5 such cows.

54. Two barrels flour cost \$9.50. Find the cost of 3 bbl. Find the cost of 5 bbl. Find the cost of 7 bbl.

55. Three pairs of shoes cost \$11.25. Find the cost of 5 pairs. Find the cost of 13 pairs.

56. When oranges sell for 30¢ per dozen, what ought one to pay for 4 oranges? For 14 oranges? For 18 oranges? For 28 oranges?

PART III

FACTORS

- | | |
|---------------------------------------|--|
| 1. $2 \times 3 \times 5 = ?$ | 6. $3 \times 3 \times 5 = ?$ |
| 2. $3 \times 5 \times 7 = ?$ | 7. $6 \times 8 \times 12 = ?$ |
| 3. $4 \times 8 \times 9 = ?$ | 8. $7 \times 11 \times 13 = ?$ |
| 4. $2 \times 5 \times 10 = ?$ | 9. $7 \times 11 \times 17 = ?$ |
| 5. $1 \times 2 \times 3 \times 4 = ?$ | 10. $1 \times 2 \times 3 \times 4 \times 5 \times 6 = ?$ |

A **product** is the result obtained by multiplying two or more numbers together.

The numbers which produce a product are called the **factors** of the product. Thus, 4 and 6 are factors of 24. So, also, are 3 and 8, 2 and 12, and 2, 2, 2, and 3, factors of 24.

EXERCISE 1 (Oral)

1. Name two pairs of factors of 18; 20; 28; 16; 12; 30; 32.
2. Name three pairs of factors of 36; 42; 48; 56; 72; 60; 40; 80.
3. Name two factors of 9; 15; 21; 22; 25; 33; 35; 38; 39; 44; 45; 46.
4. Name two factors of 51; 52; 54; 57; 64; 72; 75; 76; 78; 84; 55.

A **prime number**, or a **prime factor**, is a number whose only factors are itself and 1. Thus, 2, 3, 5, 7, 11, 13, are prime numbers, or prime factors.

5. Name the prime factors of 6; 9; 10; 12; 14; 16; 15; 18; 20; 21.

6. Name the prime factors of 22; 24; 25; 26; 27.

7. Name the prime factors of 35; 38; 39; 40; 42; 44; 45; 46; 48; 49.

8. Name the prime factors of 51; 52; 54; 55; 56; 58; 60; 62; 63; 64.

9. Name two common factors of 8 and 12; 12 and 18; 18 and 27; 16 and 24.

10. Name two common factors of 10 and 20; 24 and 30; 30 and 36; 30 and 40.

11. Name two common factors of 24 and 32; 48 and 56; 40 and 48.

12. Name two common factors of 27 and 36; 36 and 48; 60 and 72.

MEASURES AND MULTIPLES

Any factor of a number is called a **divisor** of that number.

A factor which is a divisor of two or more numbers is said to be *common* to those numbers. Thus, 2 is a common factor of 8 and 12.

The **greatest common divisor** of two or more numbers is the greatest factor common to the numbers. Thus, 4 is the greatest common divisor of 8 and 12;

6 is the greatest common divisor of 12 and 18; 9 is the greatest common divisor of 18 and 27.

The letters G. C. D. stand for greatest common divisor.

EXERCISE 2 (Oral)

What is the G. C. D. of:

- | | | |
|----------------|----------------|----------------|
| 1. 6 and 9? | 6. 8 and 16? | 11. 20 and 30? |
| 2. 6 and 12? | 7. 16 and 24? | 12. 30 and 40? |
| 3. 4 and 8? | 8. 27 and 36? | 13. 36 and 45? |
| 4. 18 and 24? | 9. 24 and 32? | 14. 32 and 40? |
| 5. 12 and 24? | 10. 32 and 40? | 15. 45 and 54? |
| 16. 48 and 56? | | |

(i.) Multiply 6 by each of the numbers, 1, 2, 3, 4, 5, 6, 7, etc.

(ii.) Multiply 7 by each of the numbers, 1, 2, 3, 4, 5, 6, 7, etc.

The products in example (i.) are called **multiples** of 6.

The products in example (ii.) are called **multiples** of 7.

A **multiple** of a number is the product obtained by multiplying the number by some other number.

(a) A few of the multiples of 6 are 12, 18, 24, 30, 36.

(b) A few of the multiples of 9 are 18, 27, 36, 45, 54.

Name two common multiples of 6 and 9.

What is the least common multiple of 6 and 9?

EXERCISE 3 (Oral)

Find the L. C. M. :

- | | | |
|---------------|----------------|---------------|
| 1. 6 and 8. | 9. 16 and 20. | 17. 3 and 4 |
| 2. 8 and 12. | 10. 18 and 27. | 18. 7 and 8 |
| 3. 12 and 18. | 11. 12 and 20. | 19. 8 and 14 |
| 4. 9 and 12. | 12. 16 and 6. | 20. 14 and 4 |
| 5. 5 and 6. | 13. 16 and 12. | 21. 15 and 18 |
| 6. 6 and 10. | 14. 16 and 24. | 22. 15 and 20 |
| 7. 4 and 10. | 15. 8 and 10. | 23. 18 and 24 |
| 8. 5 and 10. | 16. 10 and 12. | 24. 8 and 28 |

EXERCISE 4 (Written) REVIEW

1. How many steps of 2 ft. each will a boy take in going 240 ft. ?

2. If a boy takes 70 steps of 2 ft. each in one minute, at this rate how far will he walk in 1 hr. ?

3. A room is 16 ft. by 12 ft. and 9 ft. high. How many square feet in the floor? In the ceiling? In each of the four walls? How many square feet in the four walls and ceiling?

4. A lot is 124 ft. long and 48 ft. wide. How many square feet in the lot?

5. How many square feet in a square whose side is 9 ft. ?

6. What are the two equal factors of 81?

7. How many square feet in a square whose side is 11 ft. ?

8. A railroad car has a capacity of 60,000 lb. Express this in tons of 2,000 lb. each.

9. I can buy 3 A. of land for \$198. At this rate what should I pay for 1 A.? For 20 A.?

10. Four tons of hay cost \$54. Find the cost of 5 T. at the same rate. Find the cost of 9 T. at this rate.

11. The railroad fare in Texas is 3¢ a mile. What is the cost of a railroad ticket for a trip of 315 mi.? For 567 mi.?

12. At \$5.70 a linear foot, how much will it take to pave a street 635 ft. long?

13. A carpenter earns 40¢ an hour and works 8 hr. a day. How much will he earn in 25 working days?

14. A bricklayer makes 60¢ an hour and works 8 hr. a day. How much will he earn in 18 da.?

15. A family bought 3 pt. of milk at 4¢ a pint during the months of March, April, and May. Find the amount of the milk bill for the three months.

16. How many rails, each 33 ft. long, will extend one mile (1 mi. = 5,280 ft.)?

17. How many boards, each 12 ft. long, will be required to fence a lot 132 ft. long and 48 ft. wide, if the fence is three boards high?

18. How many feet of barbed wire will be required to fence a lot 450 ft. long and 239 ft. wide, if the fence is five wires high?

19. A man pays \$420 a year for house rent. What is his rent for one month? For 5 mo.? For 9 mo.?

20. A man earns a salary of \$90 a month, and spends \$42 a month. How much will he save in 6 months? In 11 months?

21. A newsboy buys papers at 3¢ apiece and sells them at 5¢ apiece. How many must he sell to make a profit of \$1?

22. A clerk sold 7 yd. of cloth at 75¢ a yard, 3 pairs of shoes at \$3.50 a pair. What was the amount of his sales? What change did he give, if he received in payment a twenty-dollar bill?

23. Find the cost of a 16-lb. ham at 22¢ a pound.

24. When 2 lb. of lard are sold for 25¢, find the cost of 6 lb.

25. The cost of water in a certain city is 23¢ a hundred cubic feet (cu. ft.). What should be the monthly water bill of a family that consumes 900 cu. ft.?

26. The cost of pine lumber is \$34.50 a thousand feet. Find the cost of 18,000 ft.

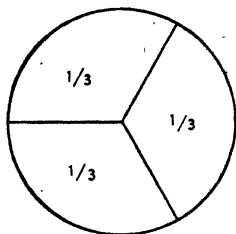
27. Find the cost of 29,000 ft. of lumber at \$27.80 a thousand feet.

28. Find the cost of 16,000 bricks at \$19.60 per thousand bricks.

29. When the cost of water is 19¢ per hundred cubic feet, what is the cost of 1550 cu. ft. of water?

FRACTIONS

If any one thing is divided into three equal parts, one of the parts is called one third of it. Two of the parts are called two thirds of it. Three of the parts are called three thirds of it.



How many inches in one third of a foot? How many inches in two thirds of a foot? How many inches in three thirds of a foot?

How many inches in one third of a yard? How many inches in two thirds of a yard?

What is one third of \$9.00? What is two thirds of \$9.00? What is one third of 15¢? What is two thirds of 15¢?

What is one third of 24? What is two thirds of 24? How many minutes in one third of an hour?

What is one third of 18? What is two thirds of 18?

How many inches in one half of a yard?

How many inches in two halves of a yard?

How many inches in three halves of a yard?

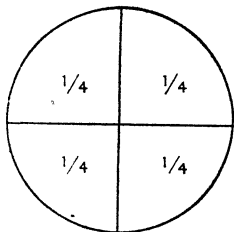
How many seconds in one half of a minute?

How many seconds in two halves of a minute?

How many seconds in three halves of a minute?

How many minutes in one third of an hour? How many hours in one third of a day? How many hours in two thirds of a day?

If any one thing is divided into four equal parts, one of the parts is called one fourth of it. Two of the parts are called two fourths of it. Three of the parts are called three fourths of it. How many fourths are in one thing?



How many inches in one fourth of a foot? How many inches in two fourths of a foot? How many inches in three fourths of a foot?

How many inches in one fourth of a yard? How many inches in two fourths of a yard? How many inches in three fourths of a yard?

How many hours in one fourth of a day? How many hours in two fourths of a day? How many hours in three fourths of a day?

How many minutes in one fourth of an hour? How many minutes in two fourths of an hour? How many minutes in three fourths of an hour?

How many quarts in one fourth of a bushel? How many quarts in two fourths of a bushel? How many quarts in three fourths of a bushel?

How many pints in one fourth of a gallon? How many pints in two fourths of a gallon? How many pints in three fourths of a gallon?

What is one fourth of 28? What is two fourths of 28? What is three fourths of 28?

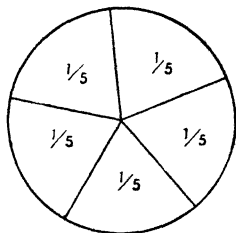
What is one half of 16? What is two fourths of 16?

What is one half of 24? What is two fourths of 24?

How does one half compare with two fourths?

Express $\frac{2}{4}$ as halves.

If any one thing is divided into five equal parts, one of the parts is called one fifth of it. Two of the parts are called two fifths of it. Three of the parts are called three fifths of it. Four of the parts are called four fifths of it.

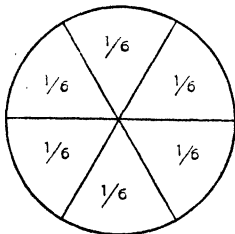


How many cents in one fifth of a dollar? How many cents in two fifths of a dollar? How many cents in three fifths of a dollar?

How many cents in four fifths of a dollar?

How many minutes in one fifth of an hour? How many minutes in two fifths of an hour? How many minutes in three fifths of an hour? How many minutes in four fifths of an hour?

What is one fifth of 20? What is two fifths of 20? What is three fifths of 20? What is four fifths of 20?



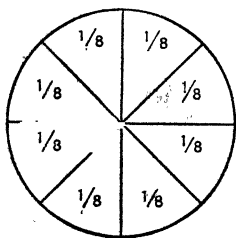
What is one sixth of one yard?
 What is two sixths of one yard?
 What is three sixths of one yard?
 What is four sixths of one yard?
 What is five sixths of one yard?

There are 60 seconds in one minute. How many seconds in one sixth of a minute? How many seconds in two sixths of a minute? How many seconds in three sixths of a minute?

To compare two fractions means to see how much one fraction is larger than another.

What is one sixth of 30? What is two sixths of 30? What is three sixths of 30? What is four sixths of 30? What is five sixths of 30? What is three sixths of 24? What is one half of 24? How do one half and three sixths compare?

What is two sixths of 24? What is one third of 24? How does two sixths compare with one third?



How many quarts in one eighth of a bushel? How many quarts in two eighths of a bushel? How many quarts in three eighths of a bushel? How many quarts in four eighths of a bushel? How many quarts in five eighths of a bushel? How many quarts in six eighths of a bushel? How many quarts in seven eighths of a bushel?

What number is one eighth of 48? What number is two eighths of 48? What is three eighths of 48? What is four eighths of 48? What is five eighths of 48? What is six eighths of 48?

What is two eighths of 64? What is one fourth of 64? How does two eighths of a number compare with one fourth of the same number?

What is four eighths of 72? What is one half of 72? How does four eighths of a number compare with one half of the same number?

What is six eighths of 40? What is three fourths of 40? How does six eighths of a number compare with three fourths of the same number?

NOTATION

One half is written $\frac{1}{2}$.	One fifth is written $\frac{1}{5}$.
Two halves is written $\frac{2}{2}$.	Three fifths is written $\frac{3}{5}$.
Three halves is written $\frac{3}{2}$.	One sixth is written $\frac{1}{6}$.
One third is written $\frac{1}{3}$.	Three sixths is written $\frac{3}{6}$.
Two thirds is written $\frac{2}{3}$.	Five sixths is written $\frac{5}{6}$.
Three thirds is written $\frac{3}{3}$.	One eighth is written $\frac{1}{8}$.
Four thirds is written $\frac{4}{3}$.	Two eighths is written $\frac{2}{8}$.
One fourth is written $\frac{1}{4}$.	Five eighths is written $\frac{5}{8}$.
Three fourths is written $\frac{3}{4}$.	Seven eighths is written $\frac{7}{8}$.
Four fourths is written $\frac{4}{4}$.	Eight eighths is written $\frac{8}{8}$.

EXERCISE 5 (Written)

Express in figures: .

- Five halves; five thirds; five fourths; four sixths; six eighths.
- Nine eighths; one seventh; one ninth; one tenth; one eleventh.
- Three sevenths; six sevenths; two ninths; five ninths; seven ninths.
- Three tenths; seven tenths; ten tenths; three elevenths; seven elevenths.
- Four sevenths; seven elevenths; ten elevenths; one twelfth; five twelfths; seven twelfths.

EXERCISE 6 (Oral)

1. If one foot is divided into five equal parts, what is each of the parts called?

2. If one is divided into five equal parts, what is each part called?

3. If an orange is divided into six equal parts, what is each of the parts called?

4. If an orange is divided into seven equal parts, what is each of the parts called?

5. If a rectangle is divided into eight equal parts, what is each of the parts called?

6. If a tract of land is divided into ten equal parts, what is each of the parts called?

7. If a line is divided into twelve equal parts, what is each of the parts called? What are two of the parts called? What are five of the parts called?

8. If a line is divided into twenty equal parts, what is each of the parts called? What are three of the parts called? What are seven of the parts called?

If any one thing is divided into two, three, four, or any other number of equal parts, one or more of these parts is called a **fraction**.

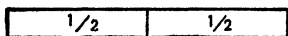
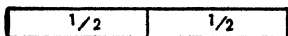
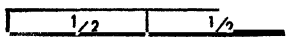
The numbers that we have dealt chiefly with in Parts I and II of this book are called whole numbers, or integers. The numbers we shall now deal with are called **fractions**.

EXERCISE 7 (Written)

- | | |
|---------------------------------|--------------------------------|
| 1. $\frac{1}{3}$ of 48 = ? | 14. $\frac{1}{8}$ of 512 = ? |
| 2. $\frac{1}{4}$ of 56 = ? | 15. $\frac{1}{7}$ of 1,463 = ? |
| 3. $\frac{1}{6}$ of 96 = ? | 16. $\frac{2}{3}$ of 48 = ? |
| 4. $\frac{1}{7}$ of 84 = ? | 17. $\frac{3}{4}$ of 44 = ? |
| 5. $\frac{1}{8}$ of 96 = ? | 18. $\frac{3}{5}$ of 60 = ? |
| 6. $\frac{1}{5}$ of 125 = ? | 19. $\frac{4}{5}$ of 55 = ? |
| 7. $\frac{1}{7}$ of 196 = ? | 20. $\frac{5}{6}$ of 36 = ? |
| 8. $\frac{1}{9}$ of 243 = ? | 21. $\frac{2}{7}$ of 35 = ? |
| 9. $\frac{1}{10}$ of 400 = ? | 22. $\frac{3}{7}$ of 49 = ? |
| 10. $\frac{1}{11}$ of 2,002 = ? | 23. $\frac{5}{7}$ of 63 = ? |
| 11. $\frac{1}{12}$ of 144 = ? | 24. $\frac{6}{7}$ of 77 = ? |
| 12. $\frac{1}{12}$ of 1,728 = ? | 25. $\frac{3}{8}$ of 48 = ? |
| 13. $\frac{1}{9}$ of 486 = ? | 26. $\frac{5}{8}$ of 72 = ? |

EXERCISE 8 (Oral)

1. How many halves in 1? How many thirds in 1?
2. How many fourths in 1? How many fifths in 1?
3. How many sixths in 1? How many sevenths in 1?
4. How many eighths in 1? How many ninths in 1?
5. How many tenths in 1? How many elevenths in 1? How many twelfths in 1?

EXERCISE 9 (Oral)

1. How many one halves in 1? How many one halves in 2? How many one halves in 3? How many one halves in 4? How many one halves in 5? How many one halves in 6? How many one halves in 7?

2. How many one halves in 10? How many one halves in 12? How many one halves in 20? How many one halves in 15?

3. How many one halves in $1\frac{1}{2}$ (one and one half)?

4. How many one halves in $2\frac{1}{2}$ (two and one half)?

5. How many one halves in $3\frac{1}{2}$? How many one halves in $4\frac{1}{2}$?

6. How many one halves in $5\frac{1}{2}$? How many one halves in $6\frac{1}{2}$?

7. How many one halves in $7\frac{1}{2}$? How many one halves in $8\frac{1}{2}$?

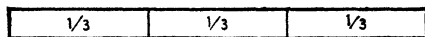
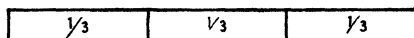
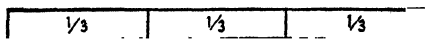
8. How many one halves in $9\frac{1}{2}$? in $10\frac{1}{2}$? in $12\frac{1}{2}$?

9. How many half dollars in $\$2\frac{1}{2}$? How many half dollars in $\$5\frac{1}{2}$?

10. How many half dollars in $\$15\frac{1}{2}$?

11. How many half dollars in $\$20\frac{1}{2}$?

EXERCISE 10 (Oral)



1. How many one thirds in 1? How many one thirds in 2? How many one thirds in 3? How many one thirds in 4? How many one thirds in 5?
2. How many one thirds in 6? in 7? in 8? in 9? in 10? in 11? in 12?
3. How many one thirds in $1\frac{1}{3}$ (one and one third)?
4. How many one thirds in $1\frac{2}{3}$ (one and two thirds)?
5. How many one thirds in $2\frac{1}{3}$ (two and one third)?
6. How many one thirds in $2\frac{2}{3}$? in $3\frac{1}{3}$? in $3\frac{2}{3}$?
7. How many one thirds in $4\frac{1}{3}$? in $4\frac{2}{3}$? in $5\frac{1}{3}$? in $5\frac{2}{3}$?
8. How many one thirds in $6\frac{2}{3}$? in $7\frac{1}{3}$? in $7\frac{2}{3}$?
9. How many one thirds in $8\frac{1}{3}$? $8\frac{2}{3}$? in $9\frac{1}{3}$? in $9\frac{2}{3}$?
10. How many one thirds in $10\frac{2}{3}$? in $12\frac{1}{3}$? in $15\frac{2}{3}$? in $16\frac{2}{3}$?

EXERCISE 11 (Oral)

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
---------------	---------------	---------------	---------------

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
---------------	---------------	---------------	---------------

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
---------------	---------------	---------------	---------------

1. How many one fourths in 1? How many one fourths in 2? How many one fourths in 3? How many one fourths in 4? How many one fourths in 5? How many one fourths in 6? in 7? in 8? in 9? in 10?

2. How many one fourths in $1\frac{1}{4}$ (one and one fourth)?

3. How many one fourths in $2\frac{3}{4}$ (two and three fourths)?

4. How many one fourths in $1\frac{3}{4}$? How many one fourths in $2\frac{1}{4}$?

5. How many one fourths in $3\frac{1}{4}$? How many one fourths in $3\frac{3}{4}$?

6. How many one fourths in $4\frac{1}{4}$? How many one fourths in $4\frac{3}{4}$?

7. How many one fourths in $5\frac{1}{4}$? How many one fourths in $5\frac{3}{4}$?

8. How many one fourths in $6\frac{1}{4}$? How many one fourths in $6\frac{3}{4}$?

9. How many one fourths in $7\frac{1}{4}$?

10. How many $\frac{1}{4}$'s in $9\frac{3}{4}$? in $11\frac{1}{4}$? in $12\frac{3}{4}$?
11. How many $\frac{1}{4}$'s in $9\frac{1}{4}$? in $11\frac{3}{4}$? in $12\frac{1}{4}$?
12. How many $\frac{1}{4}$'s in $15\frac{1}{4}$? in $13\frac{3}{4}$? in $14\frac{1}{4}$?
13. How many $\frac{1}{4}$'s in $20\frac{1}{4}$? in $15\frac{3}{4}$? in $14\frac{3}{4}$?
14. How many quarters in \$1? How many quarters in $\$ \frac{1}{2}$?
15. How many quarters in $\$ 2\frac{1}{4}$? How many quarters in $\$ 2\frac{3}{4}$?
16. How many quarters in \$10? in \$15? in $\$ 5\frac{1}{4}$? in $\$ 6\frac{3}{4}$?

MIXED NUMBERS

Numbers such as $1\frac{1}{2}$, $2\frac{1}{3}$, $3\frac{3}{4}$, etc., are called **mixed numbers**.

A **mixed number** is a number that is made up of a fraction and a whole number.

A fraction is expressed by two numbers, one of which is written above a horizontal line and the other below the same horizontal line.

The number written above the horizontal line is called the **numerator**.

The number written below the horizontal line is called the **denominator**.

Numerator means *that which numbers*. Denominator means *that which names*.

The denominator shows what kind of parts are taken. Thus, in $\frac{2}{5}$, the denominator shows that fifth parts are taken.

The numerator shows how many fractional parts

are taken. In $\frac{2}{5}$, the numerator shows that 2 of these parts are taken.

A fraction whose numerator is less than its denominator is called a **proper fraction**. Thus, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{6}$, $\frac{3}{8}$ are proper fractions.

A fraction whose numerator is equal to or greater than its denominator is called an **improper fraction**. Thus, $\frac{5}{2}$, $\frac{4}{3}$, $\frac{4}{4}$, $\frac{9}{8}$, $\frac{7}{7}$, etc., are improper fractions.

The numerator and the denominator are called the **terms of a fraction**.

Change $2\frac{3}{4}$ to fourths.

In 1 there are 4 fourths.

In 2 there are 8 fourths.

8 fourths and 3 fourths are 11 fourths.

Therefore, in $2\frac{3}{4}$ there are 11 fourths. *Ans.* $\frac{11}{4}$.

EXERCISE 12 (Oral)

Change to halves:

1. $1\frac{1}{2}$; $3\frac{1}{2}$; $5\frac{1}{2}$; $6\frac{1}{2}$; $8\frac{1}{2}$; 9; 11; 13; 15.

Change to thirds:

2. $1\frac{1}{3}$; $2\frac{2}{3}$; $3\frac{1}{3}$; $5\frac{1}{3}$; $6\frac{2}{3}$; 7; 9; 10; 15; $14\frac{1}{3}$;
 $16\frac{2}{3}$.

Change to fourths:

3. $1\frac{3}{4}$; $2\frac{1}{4}$; $3\frac{3}{4}$; $4\frac{1}{4}$; $5\frac{3}{4}$; $7\frac{1}{4}$; 9; 6; 10; 12; $13\frac{1}{4}$.

Change to fifths:

4. $1\frac{2}{5}$; $1\frac{4}{5}$; $2\frac{1}{5}$; $2\frac{4}{5}$; $3\frac{3}{5}$; 4; 11; 13; $5\frac{2}{5}$; $6\frac{3}{5}$; $7\frac{4}{5}$.

Change to sixths:

5. $1\frac{5}{6}$; $2\frac{1}{6}$; $2\frac{5}{6}$; $3\frac{5}{6}$; $4\frac{1}{6}$; $7\frac{5}{6}$; 4; 8; 12; $11\frac{1}{6}$.

Change to sevenths:

6. $1\frac{3}{7}$; $1\frac{6}{7}$; $2\frac{2}{7}$; $2\frac{6}{7}$; $3\frac{4}{7}$; $4\frac{2}{7}$; $5\frac{5}{7}$; 2; 5; 7; 9;
10 $\frac{3}{7}$.

Change to eighths:

7. $1\frac{3}{8}$; $1\frac{7}{8}$; $2\frac{5}{8}$; $2\frac{7}{8}$; $3\frac{1}{8}$; $3\frac{5}{8}$; $4\frac{7}{8}$; $7\frac{7}{8}$; 6; 9; 12.

Change to ninths:

8. $1\frac{1}{9}$; $2\frac{2}{9}$; $3\frac{4}{9}$; $5\frac{5}{9}$; $6\frac{7}{9}$; $9\frac{8}{9}$; 10; 7; 12; 8; $11\frac{1}{9}$.

Change to tenths:

9. $1\frac{1}{10}$; $2\frac{5}{10}$; $3\frac{7}{10}$; $4\frac{9}{10}$; $8\frac{7}{10}$; $9\frac{3}{10}$; 7; 10; 13;
20.

Change to twelfths:

10. $1\frac{1}{12}$; $1\frac{11}{12}$; $2\frac{5}{12}$; $3\frac{7}{12}$; $4\frac{5}{12}$; $5\frac{11}{12}$; $6\frac{1}{12}$; 5.

11. Change $4\frac{3}{4}$ to fourths; $2\frac{3}{5}$ to fifths; $2\frac{5}{7}$ to sevenths; $2\frac{1}{8}$ to eighths; $9\frac{5}{9}$ to ninths; $8\frac{9}{10}$ to tenths.

12. Change $7\frac{1}{2}$ to halves; $5\frac{2}{3}$ to thirds; $6\frac{1}{4}$ to fourths; $5\frac{4}{5}$ to fifths; $5\frac{5}{6}$ to sixths; $7\frac{6}{7}$ to sevenths.

13. Change $9\frac{7}{8}$ to eighths; $9\frac{7}{9}$ to ninths; $10\frac{7}{10}$ to tenths; $4\frac{7}{12}$ to twelfths; $3\frac{2}{9}$ to ninths; $4\frac{1}{10}$ to tenths.

Change $1\frac{7}{5}$ to a mixed number.

$$5 \text{ fifths} = 1. \quad 15 \text{ fifths} = 3.$$

$$17 \text{ fifths} = 3 \text{ wholes and } 2 \text{ fifths.}$$

That is, $1\frac{7}{5} = 3\frac{2}{5}$.

EXERCISE 13 (Oral and Written)

Change to mixed numbers:

1. $\frac{3}{2}$; $\frac{5}{2}$; $\frac{9}{2}$; $\frac{13}{2}$; $\frac{17}{2}$; $\frac{21}{2}$; $\frac{19}{2}$; $\frac{23}{2}$; $\frac{15}{2}$; $\frac{25}{2}$; $\frac{31}{2}$.
2. $\frac{4}{3}$; $\frac{5}{3}$; $\frac{7}{3}$; $\frac{10}{3}$; $\frac{14}{3}$; $\frac{17}{3}$; $\frac{19}{3}$; $\frac{23}{3}$; $\frac{25}{3}$; $\frac{13}{3}$; $\frac{16}{3}$.

3. $\frac{5}{4}$; $\frac{7}{4}$; $\frac{10}{4}$; $\frac{13}{4}$; $\frac{15}{4}$; $\frac{19}{4}$; $\frac{21}{4}$; $\frac{23}{4}$; $\frac{25}{4}$; $\frac{27}{4}$; $\frac{31}{4}$.
 4. $\frac{6}{5}$; $\frac{9}{5}$; $\frac{11}{5}$; $\frac{14}{5}$; $\frac{16}{5}$; $\frac{19}{5}$; $\frac{21}{5}$; $\frac{24}{5}$; $\frac{29}{5}$; $\frac{32}{5}$; $\frac{38}{5}$.
 5. $\frac{10}{6}$; $\frac{13}{6}$; $\frac{17}{6}$; $\frac{19}{6}$; $\frac{23}{6}$; $\frac{29}{6}$; $\frac{35}{6}$; $\frac{37}{6}$; $\frac{41}{6}$; $\frac{47}{6}$.
 6. $\frac{9}{7}$; $\frac{13}{7}$; $\frac{15}{7}$; $\frac{18}{7}$; $\frac{22}{7}$; $\frac{27}{7}$; $\frac{31}{7}$; $\frac{33}{7}$; $\frac{36}{7}$; $\frac{41}{7}$; $\frac{45}{7}$.
 7. $\frac{11}{8}$; $\frac{15}{8}$; $\frac{19}{8}$; $\frac{21}{8}$; $\frac{25}{8}$; $\frac{31}{8}$; $\frac{35}{8}$; $\frac{43}{8}$; $\frac{47}{8}$; $\frac{51}{8}$.
 8. $\frac{13}{9}$; $\frac{17}{9}$; $\frac{19}{9}$; $\frac{22}{9}$; $\frac{28}{9}$; $\frac{35}{9}$; $\frac{41}{9}$; $\frac{47}{9}$; $\frac{51}{9}$; $\frac{59}{9}$.
 9. $\frac{13}{10}$; $\frac{17}{10}$; $\frac{21}{10}$; $\frac{29}{10}$; $\frac{31}{10}$; $\frac{39}{10}$; $\frac{47}{10}$; $\frac{53}{10}$; $\frac{63}{10}$; $\frac{69}{10}$.
 10. $\frac{13}{11}$; $\frac{17}{11}$; $\frac{21}{11}$; $\frac{25}{11}$; $\frac{31}{11}$; $\frac{39}{11}$; $\frac{43}{11}$; $\frac{54}{11}$; $\frac{62}{11}$; $\frac{72}{11}$.
 11. $\frac{13}{12}$; $\frac{19}{12}$; $\frac{23}{12}$; $\frac{29}{12}$; $\frac{31}{12}$; $\frac{35}{12}$; $\frac{41}{12}$; $\frac{47}{12}$; $\frac{59}{12}$; $\frac{65}{12}$.
 12. $\frac{7}{2}$; $\frac{11}{3}$; $\frac{34}{3}$; $\frac{11}{4}$; $\frac{33}{4}$; $\frac{7}{5}$; $\frac{13}{5}$; $\frac{25}{6}$; $\frac{32}{6}$; $\frac{8}{7}$; $\frac{19}{7}$.
 13. $\frac{40}{7}$; $\frac{32}{7}$; $\frac{17}{8}$; $\frac{27}{8}$; $\frac{23}{9}$; $\frac{29}{9}$; $\frac{37}{10}$; $\frac{51}{10}$; $\frac{41}{11}$; $\frac{61}{12}$.

Add:

$$\begin{array}{r}
 11\frac{1}{4} \\
 2\frac{3}{4} \\
 3\frac{1}{4} \\
 3\frac{3}{4} \\
 4\frac{1}{4} \\
 \hline
 15\frac{1}{4}
 \end{array}
 \begin{array}{l}
 1 \text{ fourth} + 3 \text{ fourths} + 1 \text{ fourth} + 3 \text{ fourths} \\
 + 1 \text{ fourth} = 9 \text{ fourths} = \frac{9}{4} = 2\frac{1}{4}. \text{ Write } \frac{1}{4} \\
 \text{and carry 2. } 2 + 4 + 3 + 3 + 2 + 1 = 15. \\
 \text{The answer is } 15\frac{1}{4}.
 \end{array}$$

EXERCISE 14 (Written)

1. $1\frac{1}{2} + 2\frac{1}{2} + 3\frac{1}{2} + 5\frac{1}{2} = ?$ 7. $\frac{5}{6} + 4\frac{5}{6} + 6\frac{1}{6} + 2\frac{5}{6} = ?$
 2. $1\frac{1}{3} + 1\frac{2}{3} + 2\frac{2}{3} + 3\frac{1}{3} = ?$ 8. $\frac{3}{7} + \frac{5}{7} + \frac{6}{7} + 1\frac{1}{7} = ?$
 3. $4\frac{1}{4} + 3\frac{1}{4} + 2\frac{1}{4} + 5\frac{3}{4} = ?$ 9. $\frac{3}{8} + 1\frac{7}{8} + 2\frac{1}{8} + 2\frac{5}{8} = ?$
 4. $1\frac{1}{5} + 1\frac{3}{5} + 1\frac{4}{5} + 2\frac{1}{5} = ?$ 10. $\frac{7}{8} + 1\frac{3}{8} + 2\frac{5}{8} + 6\frac{7}{8} = ?$
 5. $\frac{3}{5} + \frac{4}{5} + 1\frac{1}{5} + 3\frac{2}{5} = ?$ 11. $2\frac{1}{9} + 5\frac{4}{9} + 3\frac{7}{9} + 4\frac{8}{9} = ?$
 6. $1\frac{1}{6} + \frac{5}{6} + 2\frac{5}{6} + 4\frac{1}{6} = ?$ 12. $\frac{8}{9} + \frac{7}{9} + \frac{5}{9} + 5\frac{5}{9} = ?$

$$13. \quad 1\frac{1}{10} + 1\frac{3}{10} + \frac{9}{10} + \frac{7}{10} = ?$$

$$14. \quad \frac{3}{10} + \frac{8}{10} + 2\frac{1}{10} + 4\frac{3}{10} = ?$$

$$15. \quad 2\frac{9}{10} + \frac{6}{10} + \frac{7}{10} + \frac{3}{10} = ?$$

$$16. \quad \frac{7}{11} + \frac{10}{11} + \frac{5}{11} + \frac{6}{11} = ?$$

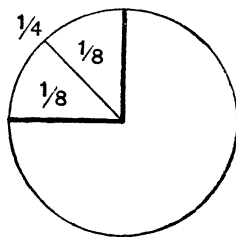
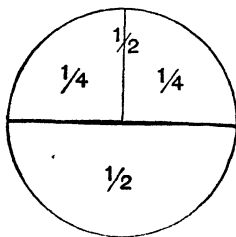
$$17. \quad 1\frac{1}{11} + \frac{9}{11} + \frac{8}{11} + 4\frac{7}{11} = ?$$

$$18. \quad 5\frac{3}{11} + \frac{2}{11} + 2\frac{4}{11} = ?$$

$$19. \quad \frac{5}{12} + \frac{11}{12} + 1\frac{1}{12} + 4\frac{11}{12} = ?$$

$$20. \quad \frac{1}{12} + \frac{5}{12} + \frac{7}{12} + \frac{11}{12} = ?$$

$$21. \quad 3\frac{7}{12} + \frac{1}{12} + 5\frac{5}{12} + \frac{11}{12} = ?$$

EXERCISE 15 (Oral and Written)

1. $\frac{1}{2}$ is equal to how many $\frac{1}{4}$'s?
2. $\frac{1}{2}$ is equal to how many $\frac{1}{8}$'s?
3. $\frac{1}{4}$ is equal to how many $\frac{1}{8}$'s?
4. What is the sum of $\frac{1}{2}$ and $\frac{1}{4}$?

$$\frac{1}{2} = \frac{2}{4}.$$

$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}.$$

$$\frac{1}{2} + \frac{1}{4} = \frac{3}{4}.$$

Therefore,

5. What is the sum of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$?

$$\frac{1}{2} = \frac{4}{8}.$$

$$\frac{1}{4} = \frac{2}{8}.$$

$$\frac{1}{8} = \frac{1}{8}.$$

Therefore, $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{4}{8} + \frac{2}{8} + \frac{1}{8} = \frac{7}{8}.$

6. What is the sum of $\frac{1}{2}$ and $\frac{3}{4}$? of $\frac{1}{2}$ and $\frac{3}{8}$? of $\frac{1}{2}$ and $\frac{5}{8}$?

7. What is the sum of $\frac{1}{2}$ and $\frac{7}{8}$? of $\frac{1}{2}$ and $\frac{1}{8}$? of $\frac{1}{4}$ and $\frac{1}{8}$?

8. What is the sum of $\frac{3}{4}$ and $\frac{1}{8}$? of $\frac{3}{4}$ and $\frac{3}{8}$? of $\frac{3}{4}$ and $\frac{5}{8}$?

9. What is the sum of $\frac{3}{4}$ and $\frac{7}{8}$? of $\frac{1}{4}$ and $\frac{3}{8}$? of $\frac{1}{4}$ and $\frac{5}{8}$?

10. What is the sum of $\frac{1}{4}$ and $\frac{7}{8}$? of $\frac{1}{2}$ and $\frac{4}{8}$?

11. What is the sum of $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{1}{8}$?

12. What is the sum of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{3}{8}$?

13. What is the sum of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{5}{8}$?

14. What is the sum of $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{7}{8}$?

✓15. $\frac{1}{2} + \frac{1}{4} + 1\frac{3}{8} = ?$

24. $2\frac{3}{8} + 3\frac{3}{8} + 3\frac{3}{4} = ?$

✓16. $\frac{1}{2} + \frac{3}{4} + \frac{5}{8} = ?$

25. $2\frac{1}{8} + 1\frac{1}{2} + 1\frac{3}{4} = ?$

✓17. $\frac{1}{2} + \frac{3}{4} + \frac{3}{8} = ?$

26. $2\frac{5}{8} + 1\frac{1}{4} + 4\frac{1}{2} = ?$

18. $2\frac{1}{2} + 3\frac{3}{4} + \frac{1}{8} = ?$

27. $1\frac{5}{8} + 5\frac{1}{4} + 3\frac{1}{2} = ?$

19. $2\frac{1}{2} + 3\frac{1}{4} + 1\frac{1}{2} = ?$

28. $5\frac{3}{8} + 2\frac{1}{2} + 2\frac{3}{4} = ?$

20. $3\frac{1}{4} + 3\frac{1}{2} + 2\frac{3}{4} = ?$

29. $2\frac{1}{4} + 3\frac{7}{8} + 2\frac{1}{2} = ?$

21. $5\frac{1}{2} + 4\frac{3}{4} + 2\frac{3}{4} = ?$

30. $1\frac{1}{8} + 5\frac{3}{4} + 6\frac{1}{2} = ?$

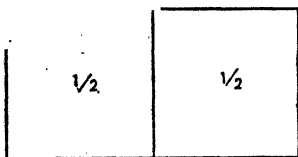
22. $6\frac{1}{4} + 4\frac{1}{2} + 1\frac{3}{4} = ?$

31. $4\frac{7}{8} + 3\frac{1}{4} + 1\frac{1}{2} = ?$

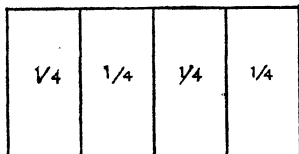
23. $1\frac{7}{8} + 1\frac{3}{4} + 1\frac{1}{8} = ?$

✓32. $1\frac{3}{8} + 7\frac{3}{4} + 2\frac{7}{8} = ?$

EXERCISE 16 (Oral)



$\frac{1}{3}$
$\frac{1}{3}$
$\frac{1}{3}$



$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$
$\frac{1}{12}$			
$\frac{1}{12}$			

1. $\frac{1}{2}$ is equal to how many $\frac{1}{12}$'s?
2. $\frac{1}{3}$ is equal to how many $\frac{1}{12}$'s?
3. $\frac{1}{4}$ is equal to how many $\frac{1}{12}$'s?
4. $\frac{2}{3}$ is equal to how many $\frac{1}{12}$'s?
5. $\frac{3}{4}$ is equal to how many $\frac{1}{12}$'s?
6. $\frac{2}{4}$ is equal to how many $\frac{1}{12}$'s?
7. $\frac{2}{2}$ is equal to how many $\frac{1}{12}$'s?
8. Show from the above illustrations that

$$\frac{1}{2} = \frac{2}{4} = \frac{6}{12}.$$
9. Show from the above illustrations that

$$\frac{1}{3} = \frac{2}{6} = \frac{4}{12}.$$
10. Show from the above illustrations that

$$\frac{2}{3} = \frac{4}{6} = \frac{8}{12}.$$
11. Show from the above illustrations that

$$\frac{1}{4} = \frac{3}{12}.$$
12. Show from the above illustrations that

$$\frac{3}{4} = \frac{9}{12}.$$

13. Take the fraction $\frac{1}{2}$. Multiply its terms by 2. How does $\frac{1}{2}$ compare with $\frac{2}{4}$? Multiply its terms by 3. How does $\frac{1}{2}$ compare with $\frac{3}{6}$? Multiply its terms by 4. How does $\frac{1}{2}$ compare with $\frac{4}{8}$?

14. What is $\frac{1}{10}$ of \$1? What is $\frac{5}{10}$ of \$1?

If you multiply the terms of the fraction $\frac{1}{2}$ by 5, what fraction do you get? How does $\frac{1}{2}$ compare with $\frac{5}{10}$?

15. Take the fraction $\frac{2}{3}$. Multiply its terms by 2. What fraction do you get? How does $\frac{2}{3}$ compare with $\frac{4}{6}$?

16. Multiply the terms of the fraction $\frac{2}{3}$ by 4. What fraction do you get? How does $\frac{2}{3}$ compare with $\frac{8}{12}$?

17. Take the fraction $\frac{3}{4}$. Multiply its terms by 2. What fraction do you get? How does $\frac{3}{4}$ compare with $\frac{6}{8}$?

18. Multiply the terms of the fraction $\frac{3}{4}$ by 3. What fraction do you get? How does $\frac{3}{4}$ compare with $\frac{9}{12}$?

If the terms of a fraction be multiplied by the same number, the value of the fraction remains unchanged.

We can see from the figures on page 193 that

$$\frac{4}{8} = \frac{1}{2}.$$

If we divide both terms of the fraction, $\frac{4}{8}$, by 4, we get $\frac{1}{2}$.

Hence, if the terms of a fraction be divided by the same number, the value of the fraction remains unchanged.

EXERCISE 17 (Written)

Copy and complete :

- | | | | |
|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1. $\frac{1}{2} = \frac{\quad}{6}$ | 6. $\frac{1}{5} = \frac{\quad}{10}$ | 11. $\frac{1}{6} = \frac{\quad}{12}$ | 16. $\frac{2}{3} = \frac{\quad}{18}$ |
| 2. $\frac{1}{3} = \frac{\quad}{12}$ | 7. $\frac{3}{5} = \frac{\quad}{20}$ | 12. $\frac{5}{6} = \frac{\quad}{18}$ | 17. $\frac{3}{5} = \frac{\quad}{25}$ |
| 3. $\frac{2}{3} = \frac{\quad}{9}$ | 8. $\frac{2}{5} = \frac{\quad}{15}$ | 13. $\frac{2}{3} = \frac{\quad}{18}$ | 18. $\frac{4}{5} = \frac{\quad}{10}$ |
| 4. $\frac{1}{4} = \frac{\quad}{12}$ | 9. $\frac{3}{4} = \frac{\quad}{20}$ | 14. $\frac{3}{4} = \frac{\quad}{16}$ | 19. $\frac{3}{4} = \frac{\quad}{24}$ |
| 5. $\frac{3}{4} = \frac{\quad}{20}$ | 10. $\frac{2}{3} = \frac{\quad}{15}$ | 15. $\frac{1}{2} = \frac{\quad}{20}$ | 20. $\frac{3}{8} = \frac{\quad}{24}$ |

A fraction is in its simplest form when its terms have no common factor.

Reduce $\frac{12}{20}$ to its simplest form.

As 4 is a common factor of numerator and denominator, dividing both terms by 4, we have

$$\frac{12}{20} = \frac{3}{5}.$$

EXERCISE 18 (Written)

Reduce each of the following fractions to its simplest form :

- | | | | | |
|-------------------|--------------------|---------------------|---------------------|---------------------|
| 1. $\frac{9}{12}$ | 5. $\frac{5}{15}$ | 9. $\frac{15}{20}$ | 13. $\frac{14}{16}$ | 17. $\frac{21}{24}$ |
| 2. $\frac{6}{12}$ | 6. $\frac{10}{20}$ | 10. $\frac{8}{20}$ | 14. $\frac{16}{24}$ | 18. $\frac{18}{24}$ |
| 3. $\frac{8}{12}$ | 7. $\frac{12}{16}$ | 11. $\frac{16}{20}$ | 15. $\frac{15}{25}$ | 19. $\frac{9}{24}$ |
| 4. $\frac{6}{9}$ | 8. $\frac{12}{18}$ | 12. $\frac{8}{18}$ | 16. $\frac{20}{25}$ | 20. $\frac{10}{25}$ |

EXERCISE 19 (Oral and Written)

To work the following examples, children should be provided with rulers graduated to sixteenths of an inch.

1. Draw a line one inch long. Two inches long. Five inches long. Six inches long.

2. Draw a line $1\frac{1}{2}$ in. long. $2\frac{1}{2}$ in. long. $3\frac{1}{2}$ in. long. $4\frac{1}{2}$ in. long. $5\frac{1}{2}$ in. long.

3. Draw a line $\frac{3}{4}$ in. long. $1\frac{3}{4}$ in. long. $2\frac{3}{4}$ in. long. $3\frac{3}{4}$ in. long. $4\frac{3}{4}$ in. long. $5\frac{3}{4}$ in. long.

4. Draw a line $\frac{1}{4}$ in. long. $1\frac{1}{4}$ in. long. $4\frac{1}{4}$ in. long. $3\frac{1}{4}$ in. long. $2\frac{1}{4}$ in. long. $5\frac{1}{4}$ in. long.

5. Draw a line $\frac{1}{8}$ in. long. $\frac{3}{8}$ in. long. $\frac{5}{8}$ in. long. $\frac{7}{8}$ in. long. $\frac{3}{4}$ in. long.

6. Which is the greater, $\frac{1}{2}$ or $\frac{3}{8}$? $\frac{5}{8}$ or $\frac{1}{2}$? $\frac{7}{8}$ or $\frac{3}{4}$?

7. Draw a line $1\frac{3}{8}$ in. long. $2\frac{1}{8}$ in. long. $3\frac{5}{8}$ in. long.

8. Draw a line $2\frac{3}{8}$ in. long. $1\frac{7}{8}$ in. long. $3\frac{1}{8}$ in. long.

9. Count by halves to six.

10. Count by fourths to four.

11. Count by eighths to three.

12. Draw a line $\frac{11}{16}$ inch. $\frac{3}{4}$ inch.

13. Which is greater, $\frac{3}{4}$ or $\frac{11}{16}$?

14. Draw a line $\frac{7}{8}$ inch. $1\frac{3}{8}$ inch.

15. Which is greater, $\frac{7}{8}$ or $1\frac{3}{8}$?

ADDITION

Add $\frac{1}{2}$ and $\frac{2}{3}$.

If fractions having different denominators are to be added, they must be reduced to fractions having the same denominator. In changing fractions to the same denominator we do not change their value.

$\frac{1}{2}$ can be reduced to sixths and $\frac{2}{3}$ can be reduced to sixths.

$$\frac{1}{2} = \frac{3}{6};$$

$$\frac{2}{3} = \frac{4}{6}.$$

Therefore, $\frac{1}{2} + \frac{2}{3} = \frac{3}{6} + \frac{4}{6} = \frac{7}{6}$.

$\frac{7}{6}$ being an improper fraction, we reduce it to a mixed number, namely, $1\frac{1}{6}$.

EXERCISE 20 (Written)

1. $\frac{1}{2} + \frac{1}{3} = ?$

5. $\frac{1}{3} + \frac{5}{6} = ?$

9. $\frac{3}{4} + \frac{1}{6} = ?$

2. $\frac{2}{3} + \frac{1}{4} = ?$

6. $\frac{1}{2} + \frac{1}{6} = ?$

10. $\frac{1}{4} + \frac{5}{6} = ?$

3. $\frac{1}{3} + \frac{3}{4} = ?$

7. $\frac{1}{2} + \frac{5}{6} = ?$

11. $\frac{3}{4} + \frac{5}{6} = ?$

4. $\frac{2}{3} + \frac{1}{6} = ?$

8. $\frac{1}{4} + \frac{1}{6} = ?$

12. $\frac{1}{2} + \frac{1}{12} = ?$

Add $\frac{1}{3}$, $\frac{3}{4}$, and $\frac{1}{6}$.

Thirds, fourths, and sixths can each be reduced to twelfths.

$$\frac{1}{3} = \frac{4}{12}.$$

$$\frac{3}{4} = \frac{9}{12}.$$

$$\frac{1}{6} = \frac{2}{12}.$$

Therefore, $\frac{1}{3} + \frac{3}{4} + \frac{1}{6} = \frac{4}{12} + \frac{9}{12} + \frac{2}{12} = \frac{15}{12}$.

$$\frac{15}{12} = 1\frac{3}{12} = 1\frac{1}{4}.$$

EXERCISE 21 (Written)

1. $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = ?$

9. $\frac{1}{2} + \frac{1}{5} + \frac{1}{10} = ?$

2. $\frac{1}{2} + \frac{2}{3} + \frac{1}{4} = ?$

10. $\frac{1}{2} + \frac{2}{5} + \frac{3}{10} = ?$

3. $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} = ?$

11. $\frac{2}{5} + \frac{7}{10} + \frac{1}{2} = ?$

4. $\frac{1}{3} + \frac{1}{4} + \frac{1}{6} = ?$

12. $\frac{3}{5} + \frac{3}{10} + \frac{1}{2} = ?$

5. $\frac{2}{3} + \frac{1}{2} + \frac{1}{6} = ?$

13. $\frac{3}{5} + \frac{9}{10} + \frac{1}{2} = ?$

6. $\frac{2}{3} + \frac{3}{4} + \frac{5}{6} = ?$

14. $\frac{1}{3} + \frac{1}{5} + \frac{2}{15} = ?$

7. $\frac{1}{3} + \frac{3}{4} + \frac{1}{6} = ?$

15. $\frac{2}{3} + \frac{2}{5} + \frac{2}{15} = ?$

8. $\frac{1}{2} + \frac{5}{6} + \frac{1}{3} = ?$

16. $\frac{3}{5} + \frac{1}{3} + \frac{11}{15} = ?$

Add $1\frac{1}{4}$, $2\frac{5}{6}$, and $1\frac{7}{12}$.

Add the fractions and the whole numbers separately, then add their sums.

Fourths, sixths, and twelfths can be reduced to twelfths.

$$\frac{1}{4} = \frac{3}{12}.$$

$$\frac{5}{6} = \frac{10}{12}.$$

$$\frac{7}{12} = \frac{7}{12}.$$

Therefore, $\frac{1}{4} + \frac{5}{6} + \frac{7}{12} = \frac{3}{12} + \frac{10}{12} + \frac{7}{12} = \frac{20}{12}$.

$$\frac{20}{12} = 1\frac{8}{12} = 1\frac{2}{3}.$$

Next, add the whole numbers, namely, 1, 2, and 1.

$$1 + 2 + 1 = 4.$$

Adding the sums, we get

$$4 + 1\frac{2}{3} = 5\frac{2}{3}, \text{ Ans.}$$

EXERCISE 22 (Written)

- | | |
|---|---|
| 1. $1\frac{1}{2} + 2\frac{1}{4} + 2\frac{2}{3} = ?$ | 8. $5\frac{1}{2} + 5\frac{5}{12} + 2\frac{1}{6} = ?$ |
| 2. $1\frac{1}{3} + 3\frac{3}{4} + 2\frac{2}{3} = ?$ | 9. $7\frac{1}{2} + 5\frac{1}{2} + 3\frac{1}{12} = ?$ |
| 3. $2\frac{1}{3} + 3\frac{1}{6} + 4\frac{1}{2} = ?$ | 10. $4\frac{5}{12} + 5\frac{5}{6} + 2\frac{1}{2} = ?$ |
| 4. $4\frac{1}{4} + 4\frac{1}{3} + 2\frac{5}{6} = ?$ | 11. $3\frac{3}{5} + 2\frac{1}{2} + 1\frac{3}{10} = ?$ |
| 5. $3\frac{2}{3} + 3\frac{5}{6} + 1\frac{1}{2} = ?$ | 12. $2\frac{2}{5} + 6\frac{1}{2} + 2\frac{7}{10} = ?$ |
| 6. $4\frac{1}{6} + 5\frac{3}{4} + 4\frac{2}{3} = ?$ | 13. $4\frac{1}{5} + 3\frac{1}{2} + 3\frac{9}{10} = ?$ |
| 7. $5\frac{1}{4} + 2\frac{1}{3} + 3\frac{1}{6} = ?$ | 14. $3\frac{1}{2} + 4\frac{1}{5} + 4\frac{9}{10} = ?$ |

EXERCISE 23 (Written)

1. A boy studies $1\frac{1}{2}$ hr. in the morning, $1\frac{2}{3}$ hr. during school, and $\frac{3}{4}$ hr. in the afternoon. How many hours does he study during the day?
2. Henry White plays $\frac{3}{4}$ hr. in the morning and $2\frac{2}{3}$ hr. in the afternoon. How many hours does he play during the day?
3. William Coan walks $2\frac{1}{2}$ mi. in the morning and $3\frac{2}{3}$ mi. in the afternoon. How many miles does he walk during the day?
4. Mary Harper has $\$ \frac{7}{10}$ and her mother gives her $\$ 1\frac{1}{2}$. How much money has she?
5. A man sold $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{6}$ of his farm to his neighbors. What part of his farm did he sell?
6. A housekeeper buys $1\frac{1}{2}$ doz. eggs on Monday, $2\frac{1}{2}$ doz. on Tuesday, and $3\frac{1}{2}$ doz. on Wednesday. How many eggs does she buy in all?

7. A housekeeper buys $2\frac{1}{4}$ lb. of meat for breakfast, $3\frac{3}{4}$ lb. for dinner, and $2\frac{1}{2}$ lb. for supper. How many pounds of meat does she buy in a day?

8. A poultry dealer bought three turkeys; one weighed $10\frac{3}{4}$ lb., another $11\frac{1}{2}$ lb., and the third $12\frac{2}{3}$ lb. How much did the three turkeys weigh?

9. How many hours are $\frac{1}{2}$ hr., $\frac{3}{4}$ hr., and $1\frac{1}{3}$ hr.?

10. How many feet are $1\frac{1}{2}$ ft., $2\frac{1}{3}$ ft., and $2\frac{3}{4}$ ft.?

11. How many dollars are \$ $1\frac{2}{5}$, \$ $2\frac{1}{2}$, and \$ $2\frac{4}{5}$?

12. How many inches are $1\frac{3}{4}$ in., $3\frac{1}{2}$ in., and $2\frac{5}{6}$ in.?

13. How many yards are $3\frac{1}{6}$ yd., $1\frac{1}{3}$ yd., and $3\frac{1}{2}$ yd.?

SUBTRACTION

From $\frac{7}{8}$ take $\frac{1}{2}$.

Reduce the fractions to fractions having the same denominator.

$\frac{1}{2}$ can be reduced to eighths.

$$\frac{7}{8} = \frac{7}{8}.$$

$$\frac{1}{2} = \frac{4}{8}.$$

Therefore, $\frac{7}{8} - \frac{1}{2} = \frac{7}{8} - \frac{4}{8} = \frac{3}{8}.$

From $\frac{3}{4}$ take $\frac{2}{3}$.

Fourths and thirds can each be reduced to twelfths.

$$\frac{3}{4} = \frac{9}{12}.$$

$$\frac{2}{3} = \frac{8}{12}.$$

Therefore, $\frac{3}{4} - \frac{2}{3} = \frac{9}{12} - \frac{8}{12} = \frac{1}{12}.$

EXERCISE 24 (Written)

- | | | |
|------------------------------------|---------------------------------------|--------------------------------------|
| 1. $\frac{1}{2} - \frac{1}{3} = ?$ | 7. $\frac{5}{6} - \frac{1}{4} = ?$ | 13. $\frac{7}{8} - \frac{3}{4} = ?$ |
| 2. $\frac{2}{3} - \frac{1}{2} = ?$ | 8. $\frac{5}{6} - \frac{3}{4} = ?$ | 14. $\frac{7}{10} - \frac{1}{2} = ?$ |
| 3. $\frac{7}{8} - \frac{1}{4} = ?$ | 9. $\frac{7}{12} - \frac{1}{2} = ?$ | 15. $\frac{9}{10} - \frac{1}{2} = ?$ |
| 4. $\frac{5}{8} - \frac{1}{2} = ?$ | 10. $\frac{11}{12} - \frac{1}{2} = ?$ | 16. $\frac{1}{6} - \frac{1}{12} = ?$ |
| 5. $\frac{5}{6} - \frac{1}{2} = ?$ | 11. $\frac{11}{12} - \frac{3}{4} = ?$ | 17. $\frac{1}{4} - \frac{1}{6} = ?$ |
| 6. $\frac{5}{6} - \frac{2}{3} = ?$ | 12. $\frac{11}{12} - \frac{5}{6} = ?$ | 18. $\frac{1}{3} - \frac{1}{4} = ?$ |

From $1\frac{1}{2}$ take $\frac{3}{4}$.

$1\frac{1}{2}$ The fraction $\frac{3}{4}$ cannot be taken from $\frac{1}{2}$.
 $\frac{3}{4}$ Therefore, reduce $1\frac{1}{2}$ to fourths. $1\frac{1}{2} = \frac{3}{2}$
 $\frac{3}{4}$ $= \frac{6}{4}$. $\frac{6}{4} - \frac{3}{4} = \frac{3}{4}$.

From $4\frac{1}{2}$ take $1\frac{2}{3}$.

$4\frac{1}{2}$ The fraction $\frac{2}{3}$ being greater than $\frac{1}{2}$,
 $1\frac{2}{3}$ take $\frac{2}{3}$ from $1\frac{1}{2}$.
 $\frac{25}{6}$ $1\frac{1}{2} = \frac{3}{2} = \frac{9}{6}$; $\frac{2}{3} = \frac{4}{6}$. $\frac{9}{6} - \frac{4}{6} = \frac{5}{6}$. Carry 1;
 1 and 1 are 2. 2 and 2 are 4. The re-
 mainder is $2\frac{5}{6}$.

How many inches are in $1\frac{1}{2}$ feet?

How many inches are in $\frac{3}{4}$ of a foot?

How many inches are in the difference between $1\frac{1}{2}$ feet and $\frac{3}{4}$ of a foot?

What fraction of a foot is this difference?

How many inches are in $4\frac{1}{2}$ feet?

How many inches are in $1\frac{2}{3}$ feet?

How many inches are in the difference between $4\frac{1}{2}$ feet and $1\frac{2}{3}$ feet?

What fraction of a foot is this difference?

EXERCISE 25 (Written)

- | | | |
|--------------------------------------|---------------------------------------|--|
| 1. $2\frac{1}{4} - \frac{1}{2} = ?$ | 9. $3\frac{2}{3} - 1\frac{3}{4} = ?$ | 17. $10\frac{1}{2} - 7\frac{5}{8} = ?$ |
| 2. $4\frac{1}{2} - 2\frac{3}{4} = ?$ | 10. $4\frac{1}{3} - 3\frac{1}{2} = ?$ | 18. $11\frac{2}{3} - 8\frac{3}{4} = ?$ |
| 3. $5\frac{1}{2} - 3\frac{3}{4} = ?$ | 11. $5\frac{2}{3} - 2\frac{3}{4} = ?$ | 19. $7\frac{1}{3} - 4\frac{5}{12} = ?$ |
| 4. $6\frac{1}{4} - 4\frac{1}{2} = ?$ | 12. $7\frac{1}{3} - 2\frac{5}{6} = ?$ | 20. $2\frac{1}{4} - 1\frac{5}{12} = ?$ |
| 5. $8\frac{1}{4} - 5\frac{3}{4} = ?$ | 13. $6\frac{1}{3} - 1\frac{5}{6} = ?$ | 21. $12\frac{2}{3} - 7\frac{5}{6} = ?$ |
| 6. $9\frac{1}{4} - 7\frac{1}{2} = ?$ | 14. $9\frac{1}{3} - 5\frac{3}{4} = ?$ | 22. $13 - 7\frac{7}{8} = ?$ |
| 7. $3\frac{1}{3} - 2\frac{2}{3} = ?$ | 15. $9\frac{1}{2} - 4\frac{5}{6} = ?$ | 23. $15 - 11\frac{7}{12} = ?$ |
| 8. $7\frac{1}{3} - 4\frac{1}{2} = ?$ | 16. $8\frac{1}{2} - 3\frac{7}{8} = ?$ | 24. $12\frac{1}{2} - 9\frac{3}{4} = ?$ |

25. A man rode $6\frac{1}{2}$ miles on horseback, and then walked a certain distance, when he was 10 miles from home. How far did he walk?

26. From a 17 lb. ham $6\frac{1}{2}$ lb. are sold. How many pounds remain?

27. A 20 acre field has $12\frac{1}{2}$ acres planted in rice and the remainder in sweet potatoes. How many acres are planted in sweet potatoes?

28. A boy has \$10 and pays $\$8\frac{1}{2}$ for a suit of clothes. How much money has he left?

29. $74\frac{1}{2}$ yards of twine are used from a spool containing 100 yards. How many yards are left?

30. San Antonio is 210 miles from Houston. After traveling $97\frac{7}{10}$ miles from Houston in the direction of San Antonio, how far is it to San Antonio?

31. From a farm containing 150 acres $97\frac{3}{4}$ acres are sold. How many acres remain in the farm?

32. Two steers weigh 1980 lb. One of them weighs $1010\frac{1}{2}$ lb. What does the other weigh?

33. A man pays a debt of $\$12\frac{3}{4}$ with a $\$20$ gold piece. How much change should he get?

34. Two turkeys weigh $20\frac{1}{2}$ pounds. The weight of one of the turkeys is $10\frac{3}{4}$ pounds. What does the other turkey weigh?

35. Two horses weigh a ton (2,000 pounds); one of them weighs $1,067\frac{1}{2}$ pounds. What does the other horse weigh?

MULTIPLICATION

Multiply $\frac{2}{3}$ by 8.

2 thirds

8

$\overline{16}$ thirds. $16 \text{ thirds} = \frac{16}{3} = 5\frac{1}{3}$.

Multiply $\frac{3}{4}$ by 6.

3 fourths

6

$\overline{18}$ fourths. $18 \text{ fourths} = \frac{18}{4} = 4\frac{2}{4} = 4\frac{1}{2}$.

To multiply a fraction by a whole number, multiply the numerator of the fraction by the whole number and write the product over the denominator. If the resulting fraction is an improper fraction, reduce it to a mixed number.

Multiply $\frac{7}{8}$ by 12.

$$\frac{7}{8} \times 12 = \frac{84}{8} = 10\frac{4}{8} = 10\frac{1}{2}.$$

We may shorten this work by noticing that 8 and 12 have a common factor, 4. Since 8 will be in the denominator of the product, and 12 in the numerator,

we may as well divide out this common factor before we multiply as after we multiply. We have just seen that

$$\frac{7}{8} \times 12 = \frac{84}{8}.$$

Dividing both numerator and denominator of $\frac{84}{8}$ by 4, we have $\frac{21}{2}$.

Now before multiplying $\frac{7}{8} \times 12$, we might have divided by 4 in either of the following ways:

$$\frac{\overset{3}{\cancel{7}}}{\underset{2}{\cancel{8}}} \times \overset{3}{\underset{2}{\cancel{12}}} = \frac{21}{2} = 10\frac{1}{2}, \text{ or } \frac{7 \times \overset{3}{\cancel{12}}}{\underset{2}{\cancel{8}}} = \frac{21}{2} = 10\frac{1}{2}.$$

Thus simplifying the work by dividing both numerator and denominator by a common factor is called **cancellation**.

EXERCISE 25 (Written)

Multiply:

- | | | |
|--------------------------|---------------------------|---------------------------|
| 1. $\frac{1}{3}$ by 5. | 11. $\frac{5}{6}$ by 12. | 21. $\frac{3}{4}$ by 14. |
| 2. $\frac{1}{2}$ by 7. | 12. $\frac{5}{8}$ by 4. | 22. $\frac{3}{5}$ by 7. |
| 3. $\frac{2}{3}$ by 9. | 13. $\frac{9}{10}$ by 10. | 23. $\frac{4}{5}$ by 10. |
| 4. $\frac{3}{4}$ by 10. | 14. $\frac{11}{12}$ by 8. | 24. $\frac{6}{7}$ by 7. |
| 5. $\frac{7}{8}$ by 4. | 15. $\frac{7}{12}$ by 12. | 25. $\frac{3}{7}$ by 11. |
| 6. $\frac{9}{10}$ by 5. | 16. $\frac{5}{12}$ by 10. | 26. $\frac{5}{7}$ by 14. |
| 7. $\frac{7}{10}$ by 8. | 17. $\frac{5}{9}$ by 3. | 27. $\frac{7}{11}$ by 11 |
| 8. $\frac{3}{10}$ by 12. | 18. $\frac{8}{9}$ by 9. | 28. $\frac{10}{11}$ by 22 |
| 9. $\frac{3}{8}$ by 8. | 19. $\frac{4}{9}$ by 12. | 29. $\frac{5}{11}$ by 8. |
| 10. $\frac{2}{3}$ by 6. | 20. $\frac{5}{8}$ by 6. | 30. $\frac{7}{8}$ by 9. |

$$\frac{3}{4} \text{ of } 7 = ?$$

$$\frac{1}{4} \text{ of } 7 = \frac{7}{4}.$$

$$\text{Therefore, } \frac{3}{4} \text{ of } 7 = 3 \times \frac{7}{4} = \frac{3 \times 7}{4} = \frac{21}{4} = 5\frac{1}{4}.$$

EXERCISE 26 (Written)

- | | | |
|----------------------------|-----------------------------|-------------------------------|
| 1. $\frac{1}{2}$ of 11 = ? | 8. $\frac{2}{3}$ of 27 = ? | 15. $\frac{7}{12}$ of 18 = ? |
| 2. $\frac{2}{3}$ of 8 = ? | 9. $\frac{3}{8}$ of 12 = ? | 16. $\frac{5}{12}$ of 16 = ? |
| 3. $\frac{3}{4}$ of 15 = ? | 10. $\frac{7}{8}$ of 20 = ? | 17. $\frac{7}{10}$ of 15 = ? |
| 4. $\frac{3}{5}$ of 20 = ? | 11. $\frac{5}{8}$ of 18 = ? | 18. $\frac{3}{10}$ of 25 = ? |
| 5. $\frac{2}{5}$ of 18 = ? | 12. $\frac{5}{9}$ of 12 = ? | 19. $\frac{9}{10}$ of 35 = ? |
| 6. $\frac{1}{6}$ of 21 = ? | 13. $\frac{4}{9}$ of 15 = ? | 20. $\frac{11}{12}$ of 20 = ? |
| 7. $\frac{5}{6}$ of 15 = ? | 14. $\frac{6}{7}$ of 21 = ? | 21. $\frac{3}{8}$ of 28 = ? |

Multiply $1\frac{3}{4}$ by 7.

$1\frac{3}{4}$ First, multiply $\frac{3}{4}$ by 7; write the result,
 $5\frac{1}{4}$. Second, multiply 1 by 7; write the re-
 $5\frac{1}{4}$ sult, 7. Third, add the two partial prod-
 7 ucts.
 $12\frac{1}{4}$

EXERCISE 27 (Written)

- | | | |
|-----------------------------|-------------------------------|-------------------------------|
| 1. $1\frac{1}{2}$ by 6 = ? | 9. $2\frac{5}{6}$ by 3 = ? | 17. $1\frac{9}{10}$ by 15 = ? |
| 2. $1\frac{1}{4}$ by 10 = ? | 10. $5\frac{1}{6}$ by 8 = ? | 18. $4\frac{5}{12}$ by 8 = ? |
| 3. $1\frac{3}{4}$ by 6 = ? | 11. $4\frac{1}{9}$ by 3 = ? | 19. $3\frac{7}{12}$ by 6 = ? |
| 4. $1\frac{1}{5}$ by 10 = ? | 12. $6\frac{5}{9}$ by 12 = ? | 20. $2\frac{1}{12}$ by 4 = ? |
| 5. $1\frac{2}{5}$ by 6 = ? | 13. $7\frac{7}{9}$ by 15 = ? | 21. $5\frac{5}{8}$ by 4 = ? |
| 6. $1\frac{4}{5}$ by 15 = ? | 14. $8\frac{1}{6}$ by 11 = ? | 22. $6\frac{7}{8}$ by 10 = ? |
| 7. $1\frac{2}{3}$ by 7 = ? | 15. $1\frac{1}{10}$ by 12 = ? | 23. $9\frac{5}{6}$ by 3 = ? |
| 8. $4\frac{1}{3}$ by 5 = ? | 16. $1\frac{3}{10}$ by 5 = ? | 24. $7\frac{2}{3}$ by 12 = ? |

Multiply $6 \times \frac{1}{3}$.

$$6 \times \frac{1}{3} = \frac{6}{3} = 2.$$

Notice that to multiply by $\frac{1}{3}$ is the same as dividing by 3: for $6 \div 3 = 2$. Or we may say, $\frac{1}{3}$ of 6 is 2, or $\frac{1}{3} \times 6 = 2$.

Multiply $\frac{6}{10}$ by $\frac{1}{3}$. Here instead of being asked to find $\frac{1}{3}$ of 6 wholes, we are asked to find $\frac{1}{3}$ of 6 tenths.

We find, using the same way we used in solving the preceding example, that $\frac{1}{3}$ of $\frac{6}{10}$ is $\frac{2}{10}$.

We might reach the same result by multiplying the numerators of the fractions together to find the numerator of the product, and multiplying the denominators together to find the denominator of the product. Thus:

$$\frac{1}{3} \times \frac{6}{10} = \frac{6}{30} = \frac{2}{10} = \frac{1}{5}.$$

To multiply one fraction by another:

Multiply the numerators together for the numerator of the product and the denominators together for the denominator of the product. Reduce the answer to lowest terms.

A fraction is reduced to lowest terms when its numerator and its denominator are made as small as possible without altering the value of the fraction. Thus, $\frac{4}{8}$ reduced to lowest terms is $\frac{1}{2}$. $\frac{4}{4}$ reduced to lowest terms equals 1.

EXERCISE 28 (Written)

- | | | |
|--|--|--|
| 1. $\frac{2}{5}$ of $\frac{3}{4} = ?$ | 4. $\frac{7}{8}$ of $\frac{4}{5} = ?$ | 7. $\frac{3}{4}$ of $\frac{5}{9} = ?$ |
| 2. $\frac{3}{4}$ of $\frac{8}{9} = ?$ | 5. $\frac{5}{8}$ of $\frac{9}{10} = ?$ | 8. $\frac{4}{5}$ of $\frac{5}{8} = ?$ |
| 3. $\frac{5}{6}$ of $\frac{7}{10} = ?$ | 6. $\frac{3}{8}$ of $\frac{7}{9} = ?$ | 9. $\frac{9}{10}$ of $\frac{2}{3} = ?$ |

10. $\frac{7}{12}$ of $\frac{6}{7} = ?$ 14. $\frac{7}{15}$ of $\frac{6}{7} = ?$ 18. $\frac{5}{16} \times \frac{3}{5} = ?$
 11. $\frac{5}{12}$ of $\frac{4}{5} = ?$ 15. $\frac{9}{10} \times \frac{5}{9} = ?$ 19. $\frac{13}{20} \times \frac{5}{8} = ?$
 12. $\frac{11}{12}$ of $\frac{10}{11} = ?$ 16. $\frac{9}{16} \times \frac{8}{11} = ?$ 20. $\frac{17}{20} \times \frac{10}{11} = ?$
 13. $\frac{8}{15}$ of $\frac{5}{9} = ?$ 17. $\frac{7}{16} \times \frac{4}{21} = ?$ 21. $\frac{11}{18} \times \frac{9}{22} = ?$

Change a mixed number to a fraction before multiplying by it.

Multiply $1\frac{1}{2}$ by $1\frac{1}{3}$.

Change each of these mixed numbers to improper fractions, and then proceed as in the last exercise.

$$\begin{array}{r}
 1 \quad 2 \\
 1\frac{1}{2} = \frac{3}{2}. \quad \frac{\cancel{3}}{2} \times \frac{\cancel{4}}{\cancel{3}} = \frac{1 \times 2}{1 \times 1} = 2. \\
 1\frac{1}{3} = \frac{4}{3}. \quad \frac{\cancel{4}}{3} \times \frac{\cancel{3}}{\cancel{4}} = \frac{1 \times 1}{1 \times 1} = 1.
 \end{array}$$

EXERCISE 29 (Written)

1. $1\frac{1}{4} \times 1\frac{1}{7} = ?$ 6. $1\frac{5}{6} \times 1\frac{1}{2} = ?$ 11. $1\frac{3}{4} \times 1\frac{4}{7} = ?$
 2. $2\frac{3}{4} \times 1\frac{3}{11} = ?$ 7. $1\frac{2}{7} \times 4\frac{2}{3} = ?$ 12. $2\frac{1}{6} \times 1\frac{2}{13} = ?$
 3. $2\frac{1}{2} \times 2\frac{1}{2} = ?$ 8. $1\frac{1}{9} \times 1\frac{1}{5} = ?$ 13. $1\frac{4}{11} \times 1\frac{1}{10} = ?$
 4. $3\frac{1}{2} \times 3\frac{1}{2} = ?$ 9. $5\frac{1}{2} \times 5\frac{1}{2} = ?$ 14. $2\frac{7}{9} \times 2\frac{4}{5} = ?$
 5. $4\frac{1}{2} \times 1\frac{1}{3} = ?$ 10. $1\frac{2}{3} \times 1\frac{2}{5} = ?$ 15. $3\frac{5}{9} \times 1\frac{9}{16} = ?$

16. Find the cost of $2\frac{1}{2}$ lb. of butter at $\$ \frac{1}{4}$ per pound.

17. What is the value of $2\frac{1}{3}$ A. of land at $\$ 7\frac{1}{2}$ per acre?

18. What is the value of $4\frac{1}{2}$ bbl. of flour at $\$ 4\frac{4}{5}$ per barrel?

19. Multiply $7\frac{2}{3}$ by $5\frac{3}{4}$.

DIVISION

Divide $5\frac{3}{4}$ by 8.

To divide a number by 8 means to take the eighth part of it. $\frac{1}{8}$ of $5\frac{3}{4} = \frac{1}{8} \times \frac{23}{4} = \frac{23}{32}$.

EXERCISE 30 (Written)

Divide :

- | | | |
|---------------------------|---------------------------|----------------------------|
| 1. $2\frac{3}{4}$ by 2. | 6. $13\frac{5}{7}$ by 16. | 11. $3\frac{8}{9}$ by 7. |
| 2. $1\frac{1}{2}$ by 3. | 7. $4\frac{1}{2}$ by 6. | 12. $4\frac{1}{11}$ by 6. |
| 3. $6\frac{7}{8}$ by 11. | 8. $9\frac{2}{3}$ by 4. | 13. $5\frac{5}{9}$ by 20. |
| 4. $6\frac{3}{4}$ by 9. | 9. $5\frac{5}{8}$ by 3. | 14. $3\frac{7}{11}$ by 8. |
| 5. $5\frac{5}{11}$ by 12. | 10. $8\frac{3}{8}$ by 10. | 15. $8\frac{2}{11}$ by 18. |

Divide 2 by $\frac{1}{4}$.

We know that there are 4 one fourths in 1 and 8 one fourths in 2. That is, $\frac{1}{4}$ goes into 2 eight times or $2 \div \frac{1}{4} = 8$. We might have got the same answer by inverting the $\frac{1}{4}$ and multiplying 2 by it.

Inverting $\frac{1}{4}$ means writing 4 as the numerator and 1 as the denominator. Thus: $\frac{4}{1}$.

$$2 \div \frac{1}{4} = 2 \times \frac{4}{1} = \frac{8}{1} = 8.$$

Divide $1\frac{1}{2}$ by $\frac{3}{4}$.

$$1\frac{1}{2} \div \frac{3}{4} = \frac{12}{8}$$

$$\frac{3}{4} = \frac{6}{8}$$

$$\frac{12}{8} \div \frac{6}{8} = 2$$

So we find that $\frac{3}{4}$ goes 2 times into $1\frac{1}{2}$. We might have reached the same answer by writing $1\frac{1}{2}$ as $\frac{3}{2}$, then inverting the $\frac{3}{4}$ and multiplying.

Thus,

$$\frac{3}{2} \times \frac{4}{3} = \frac{12}{6} = 2.$$

To divide by a fraction invert the divisor and multiply. Change mixed numbers to fractions before dividing.

EXERCISE 31 (Written)

- | | | |
|---|---|--|
| 1. $6 \div \frac{2}{3} = ?$ | 7. $3\frac{3}{4} \div \frac{10}{11} = ?$ | 13. $1\frac{3}{4} \div \frac{7}{8} = ?$ |
| 2. $9 \div \frac{3}{4} = ?$ | 8. $2\frac{1}{6} \div \frac{13}{15} = ?$ | 14. $2\frac{1}{7} \div \frac{3}{7} = ?$ |
| 3. $7\frac{1}{2} \div \frac{3}{4} = ?$ | 9. $5\frac{4}{5} \div \frac{8}{9} = ?$ | 15. $2\frac{2}{9} \div \frac{4}{5} = ?$ |
| 4. $\frac{3}{4} \div \frac{2}{3} = ?$ | 10. $4\frac{1}{6} \div \frac{10}{13} = ?$ | 16. $1\frac{10}{11} \div \frac{4}{11} = ?$ |
| 5. $1\frac{7}{11} \div \frac{5}{6} = ?$ | 11. $\frac{9}{10} \div \frac{8}{15} = ?$ | 17. $2\frac{1}{12} \div \frac{5}{8} = ?$ |
| 6. $2\frac{2}{3} \div \frac{4}{5} = ?$ | 12. $\frac{7}{8} \div \frac{7}{9} = ?$ | 18. $10\frac{2}{3} \div \frac{6}{11} = ?$ |

EXERCISE 32 (Review)

- $\frac{2}{3}$ of a boy's money is 20¢. How many cents has he?
- $\frac{3}{4}$ of the distance between two cities is 18 mi. How many miles apart are the cities?
- A train runs 24 mi. in $\frac{2}{3}$ of an hour. How far will it run in 1 hr.?
- A carpenter earns 48¢ in $\frac{4}{5}$ of an hour. How much does he earn in 1 hr.?
- A boy works 6 examples in $\frac{3}{5}$ of an hour. How many examples will he work in 1 hr.?
- $\frac{4}{5}$ of a flock of sheep is 80. How many sheep in the flock?
- 35 pupils of a class are promoted. This number is $\frac{5}{7}$ of the number in the class. How many pupils in the class?

8. A man pays $\frac{3}{8}$ of his wages for board. He pays \$6.00 per week for board. What are his weekly wages?

9. How many pairs of shoes at \$ $2\frac{3}{4}$ a pair can be bought for \$ $35\frac{3}{4}$?

EXERCISE 33 (Written)

- | | | |
|-------------------------------|--------------------------------|---------------------------------|
| 1. $68\frac{2}{3} \div 4 = ?$ | 5. $36\frac{6}{11} \div 6 = ?$ | 9. $83\frac{1}{3} \div 10 = ?$ |
| 2. $18\frac{1}{2} \div 5 = ?$ | 6. $38\frac{8}{9} \div 5 = ?$ | 10. $77\frac{7}{9} \div 14 = ?$ |
| 3. $24\frac{4}{5} \div 4 = ?$ | 7. $37\frac{1}{2} \div 5 = ?$ | 11. $46\frac{2}{3} \div 12 = ?$ |
| 4. $25\frac{5}{8} \div 5 = ?$ | 8. $66\frac{2}{3} \div 8 = ?$ | 12. $64\frac{2}{7} \div 9 = ?$ |

REVIEW OF FRACTIONS

EXERCISE 34 (Written)

- Which is larger, $\frac{3}{4}$ or $\frac{4}{5}$?
- What number must be added to the sum of $1\frac{1}{2}$ and $2\frac{1}{3}$ to make 5?
- What number must be taken from $4\frac{1}{3}$ to leave for a remainder $\frac{5}{6}$?
- A man has \$ $12\frac{1}{2}$ and spends \$ $5\frac{3}{4}$. How many dollars has he left?
- A man has a ten-dollar bill. How much will he have left after spending \$ $2\frac{3}{4}$ and \$ $4\frac{2}{5}$?
- Find the cost of 6 lb. of sugar at $4\frac{1}{2}\phi$ a pound.
- Find the cost of 5 bu. of wheat at $79\frac{1}{2}\phi$ a bushel.
- Find the cost of $6\frac{1}{2}$ yd. of muslin at $7\frac{1}{2}\phi$ a yard.
- What will 10 bu. of oats cost at $29\frac{1}{4}\phi$ a bushel?

10. What will $8\frac{1}{2}$ lb. of meat cost at $12\frac{1}{2}\phi$ a pound?
11. What will 10 bu. of oats cost at $29\frac{1}{4}\phi$ a bushel?
12. What will $8\frac{1}{2}$ lb. of meat cost at $12\frac{1}{2}\phi$ a pound?
13. What will $1\frac{1}{2}$ lb. of tea cost at 56ϕ a pound?
14. A farmer sold $5\frac{1}{2}$ A. of land at $\$25\frac{1}{2}$ an acre. How much did he receive for his land?
15. A coal dealer sells $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{6}$ of his coal. What fraction of his coal remains unsold?
16. A man dying, leaves $\frac{1}{3}$ of his property to his widow, $\frac{1}{6}$ to each of his two sons, and the remainder for charity. What part of his property does he leave for charity?
17. A farmer bought a flock of sheep; $\frac{1}{6}$ of them died during the winter, $\frac{1}{12}$ of them were killed by wolves, and he sold the remainder in the spring. What part of the flock did he sell?
18. A tract of land consisting of $78\frac{3}{4}$ A. was divided equally among 6 people. How many acres did each receive?
19. If 6 lb. of tea are bought for $\$2$, what is the price per pound?
20. If 8 lb. of sugar cost 36ϕ , what is the price per pound?
21. How many razors at $\$1\frac{1}{2}$ apiece can be bought for $\$10\frac{1}{2}$?
22. How many heating stoves at $\$5\frac{1}{4}$ apiece can be bought for $\$26\frac{1}{4}$?

23. A brick mason works $5\frac{1}{2}$ da. at $\$4\frac{1}{2}$ a day. How much money does he earn?

24. How many days must a laborer work at $\$1\frac{3}{4}$ a day to earn \$70?

25. A carpenter earns $\$3\frac{1}{5}$ a day. How many days must he work to earn $\$102\frac{2}{5}$?

26. How many bushels of wheat at $84\frac{3}{8}$ ¢ a bushel must be sold to pay for a ton of coal which costs \$6.75?

27. The quotient is $1\frac{1}{2}$ and the dividend is $2\frac{1}{4}$. Find the divisor.

28. The multiplier is $3\frac{3}{4}$ and the product is $37\frac{1}{2}$. Find the multiplicand.

29. The remainder is $1\frac{1}{2}$ and the minuend is $5\frac{1}{8}$. Find the subtrahend.

RATIO OF NUMBERS

Ratio means Quotient.

Thus, The ratio of 6 to 3 is 2.

The ratio of 3 to 6 is $\frac{1}{2}$, for $\frac{3}{6} = \frac{1}{2}$.

EXERCISE 35 (Oral)

1. What part of a foot is 1 in.? What part of a foot is 2 in.? What part of a foot is 3 in.? 4 in.? 5 in.? 6 in.? 7 in.? 9 in.? 10 in.?

2. What part of a day is 1 hr.? 2 hr.? 3 hr.? 4 hr.? 5 hr.? 6 hr.? 8 hr.? 9 hr.? 15 hr.? 16 hr.? 18 hr.? 20 hr.?

3. What part of an hour is 1 min.? 2 min.? 3 min.? 5 min.? 6 min.? 10 min.? 13 min.? 15 min.? 25 min.? 36 min.?

4. What part of a bushel is 1 qt.? 2 qt.? 4 qt.? 5 qt.? 7 qt.? 9 qt.? 12 qt.? 16 qt.? 20 qt.? 24 qt.? 28 qt.?

5. What part of a yard is 1 in.? 2 in.? 3 in.? 4 in.? 5 in.? 8 in.? 11 in.? 15 in.? 16 in.? 20 in.? 24 in.? 30 in.? 33 in.?

6. What part of \$1 is 1¢? 2¢? 3¢? 4¢? 5¢? 6¢? 7¢? 9¢? 11¢? 15¢? 18¢? 20¢? 23¢? 25¢? 30¢? 31¢? 35¢? 40¢? 45¢? 50¢? 56¢? 60¢? 70¢? 75¢? 80¢? 90¢? 95¢?

7. What part of a gallon is 1 pt.? 2 pt.? 3 pt.? 4 pt.? 5 pt.? 7 pt.?

8. What part of 1 gallon is 1 qt.? 2 qt.? 3 qt.? 5 qt.?

9. What part of a yard is 6 in.? 11 in.? 1 ft. 1 in.? 1 ft. 2 in.? 1 ft. 5 in.? 1 ft. 9 in.? 2 ft. 1 in.? 2 ft. 4 in.? 2 ft. 10 in.? 3 ft. 4 in.? 3 ft. 6 in.? 4 ft. 5 in.?

10. There are 30 days in a business month. What part of a business month is 1 da.? 2 da.? 3 da.? 4 da.? 5 da.? 6 da.? 7 da.? 9 da.? 10 da.? 12 da.? 14 da.? 15 da.? 18 da.? 20 da.? 21 da.? 24 da.? 27 da.?

11. What part of a week is 2 da.? 3 da.?

12. There are 365 days in a common year. What part of a common year is 1 da.? 2 da.? 3 da.? 5 da.? 7 da.? 10 da.? 12 da.? 15 da.? 20 da.? 25 da.? 30 da.? 40 da.? 45 da.? 50 da.? 60 da.? 73 da.? 90 da.? 100 da.? 110 da.? 120 da.? 146 da.? 150 da.? 170 da.? 180 da.? 200 da.? 219 da.? 250 da.? 292 da.?

13. What part of a year is 1 mo.? 2 mo.? 3 mo.? 4 mo.? 5 mo.? 6 mo.? 7 mo.? 8 mo.? 9 mo.? 10 mo.? 11 mo.?

14. There are 1,760 yd. in one mile. What part of a mile is 1 yd.? 2 yd.? 5 yd.? 8 yd.? 10 yd.? 12 yd.? 20 yd.? 30 yd.? 40 yd.? 60 yd.? 80 yd.? 88 yd.? 100 yd.? 176 yd.? 220 yd.? 352 yd.? 440 yd.? 880 yd.? 704 yd.? 1,056 yd.?

EXERCISE 36 (Oral)

What fraction of:

1. 4 is 1? 4 is 2? 4 is 3?
2. 6 is 1? 6 is 2? 6 is 3? 6 is 4? 6 is 5?
3. 8 is 1? 8 is 2? 8 is 3? 8 is 4? 8 is 6? 8 is 7?
4. 10 is 1? 10 is 2? 10 is 3? 10 is 4? 10 is 5? 10 is 6? 10 is 8?
5. 12 is 1? 12 is 2? 12 is 3? 12 is 4? 12 is 6? 12 is 8? 12 is 10?
6. 20 is 1? 20 is 2? 20 is 4? 20 is 5? 20 is 8? 20 is 10? 20 is 12? 20 is 15? 20 is 18?

7. 30 is 1? 30 is 3? 30 is 4? 30 is 5? 30 is 6? 30 is 9? 30 is 12? 30 is 15? 30 is 18? 30 is 20? 30 is 24? 30 is 27?

8. 100 is 5? 100 is 10? 100 is 15? 100 is 20? 100 is 25? 100 is 30? 100 is 50? 100 is 75?

9. What fraction of 2 ft. 3 in. is 3 in.? 6 in.? 9 in.? 12 in.? 1 ft. 3 in.? 1 ft. 6 in.? 1 ft. 9 in.?

EXERCISE 37 (Oral)

1. What is $\frac{1}{3}$ of 2? What is $\frac{2}{3}$ of 1?

2. What is $\frac{1}{4}$ of 3? What is $\frac{3}{4}$ of 1?

3. What is $\frac{1}{5}$ of 2? What is $\frac{2}{5}$ of 1?

4. What is $\frac{1}{7}$ of 3? What is $\frac{3}{7}$ of 1?

5. What is $\frac{1}{8}$ of 5? What is $\frac{5}{8}$ of 1?

6. What is $\frac{1}{9}$ of 4? What is $\frac{4}{9}$ of 1?

The fraction $\frac{2}{3}$ may be read either of two ways, one third of two, or two thirds of one.

The fraction $\frac{3}{4}$ may be read either of two ways, one fourth of three, or three fourths of one.

The fraction $\frac{4}{9}$ may be read either of two ways, one ninth of four, or four ninths of one.

Take the fraction $\frac{17}{3}$. This means $\frac{1}{3}$ of 17, or 17 thirds.

$$\frac{1}{3} \text{ of } 17 = 5\frac{2}{3}.$$

$$17 \div 3 = 5\frac{2}{3}.$$

Hence, division is indicated in two ways, namely, by \div , and by writing the dividend above the horizontal line, and the divisor below the same horizontal line.

NOTATION OF RATIO

Division is also written another way :

3 : 5 means the ratio of 3 to 5.

or $3 \div 5$ or $\frac{3}{5}$.

EXERCISE 38 (Oral)

Find the values of the following ratios:

- | | | |
|--------------|--------------|-------------------------------|
| 1. 6 : 9. | 11. 24 : 32. | 21. 10¢ : \$ 1. |
| 2. 8 : 12. | 12. 24 : 40. | 22. 15¢ : \$ 1. |
| 3. 4 : 10. | 13. 32 : 40. | 23. 20¢ : \$ 1. |
| 4. 12 : 21. | 14. 24 : 36. | 24. 25¢ : \$ 1. |
| 5. 16 : 24. | 15. 12 : 30. | 25. $16\frac{2}{3}$ ¢ : \$ 1. |
| 6. 18 : 32. | 16. 18 : 30. | 26. 75¢ : \$ 1. |
| 7. 16 : 36. | 17. 20 : 32. | 27. 16 in. : 1 yd. |
| 8. 15 : 25. | 18. 25 : 60. | 28. 40 min. : 1 hr. |
| 9. 20 : 30. | 19. 24 : 60. | 29. 440 yd. : 1 mi. |
| 10. 18 : 24. | 20. 27 : 60. | 30. 16 hr. : 1 da. |

DECIMALS

In our system of notation a figure in the first place after the decimal point denotes so many tenths. Thus, 4 written in the first place after the decimal point denotes 4 tenths, $\frac{4}{10}$. That is, $.4 = \frac{4}{10}$.

6.4 is read, six and four tenths and has the same value as $6\frac{4}{10}$.

4 in the second place to the right of the decimal point denotes 4 hundredths, or it is one tenth of the value of the 4 on its left.

Thus, 6.04 is read, six and four hundredths, and has the same value as $6\frac{4}{100}$.

6.14 is read, six and fourteen hundredths, and has the same value as $6\frac{14}{100}$. 6.14 equals 6 wholes, 1 tenth, 4 hundredths.

4 written in the third place after the decimal point denotes 4 thousandths, or it is one tenth of the value of the 4 written on its left.

Thus, 6.004 is read six and four thousandths, and has the same value as $6\frac{4}{1000}$.

6.014 is read, six and fourteen thousandths, and has the same value as $6\frac{14}{1000}$.

6.014 = 6 wholes, 0 tenths, 1 hundredth, 4 thousandths.

6.714 is read, six and seven hundred fourteen thousandths.

6.714 = 6 wholes, 7 tenths, 1 hundredth, 4 thousandths.

If we write 4 in the fourth place after the decimal point, it denotes 4 ten-thousandths, or it is one tenth of the value of the 4 to its left, and so on.

Thus, 6.0004 is read, six and four ten-thousandths, and has the same value as $6\frac{4}{10000}$.

6.0014 is read, six and fourteen ten-thousandths, and has the same value as $6\frac{14}{10000}$.

6.0014 = 6 wholes, 0 tenths, 0 hundredths, 1 thousandth, four ten-thousandths.

6.0214 is read, six and 214 ten thousandths, and has the same value as $6\frac{214}{10000}$.

6.0214 = 6 wholes, 0 tenths, 2 hundredths, 1 thousandth, 4 ten-thousandths.

6.3214 is read, six and three thousand two hundred fourteen ten-thousandths, and has the same value as $6\frac{3214}{10000}$.

$6.3214 = 6$ wholes, 3 tenths, 2 hundredths, 1 thousandth, 4 ten-thousandths.

Starting from the units' place, to the left, we have tens, hundreds, thousands, ten thousands, etc. If we go to the right from the units' place, we have tenths, hundredths, thousandths, ten-thousandths, etc., in succession.

What do the figures 6.234 denote?

$$\text{Ans. } 6 \text{ ones} + \frac{2}{10} + \frac{3}{100} + \frac{4}{1000}.$$

$$\frac{4}{1000} = \frac{4}{1000}.$$

$$\frac{3}{100} = \frac{30}{1000}.$$

$$\frac{2}{10} = \frac{20}{100} = \frac{200}{1000}.$$

Therefore,

$$\frac{2}{10} + \frac{3}{100} + \frac{4}{1000} = \frac{200}{1000} + \frac{30}{1000} + \frac{4}{1000} = \frac{234}{1000}.$$

Hence, 6.234 is read 6 and 234 thousandths.

.145 is read 145 thousandths. 7.023 is read 7 and 23 thousandths.

.078 is read 78 thousandths. 12.0379 is read 12 and 379 ten-thousandths.

EXERCISE 39 (Oral and Written)

Read:

1. .24; 7.01; 9.08; 8.12; 15.83; 27.45; 100.01; 2,000.06.

2. 5.274; 8.569; 9.301; 200.506; 800.947; 1,000.602; 3,000.523.

3. 10.073; 15.085; 27.032; 18.011; 208.022; 506.035; 704.098.

4. 11.7632; 29.6349; 3.1416; 1.07958; 57.0572; 8.0039; 9.0008.

5. 6.23584; 9.38123; 10.72965; 12.04012; 20.03096; 17.00012.

Write in figures:

1. Twenty-five hundredths. Seventy-two hundredths. Sixty-four hundredths. Nine hundredths. Eight hundredths. Eighty-four hundredths. Ninety-five hundredths. Four hundredths. Ninety-three hundredths.

2. Write in figures four hundred sixty-five thousandths. To express this number in figures, we write 465 as if it were a whole number, making the 5 occupy the fourth place by placing a cipher before the 4 and writing the decimal point. We then have .0465.

Write in figures twenty-five hundred-thousandths. To express this number in figures, we write 25 as if it were a whole number, making the 5 occupy the fifth place by placing three ciphers before the 2 and writing the decimal point. Doing this, we have .00025.

3. Express in figures: one hundred fifty-four thousandths. Six hundred twenty-eight thousandths. Four hundred fifteen thousandths.

4. Express in figures: Four hundred fifty-six thousandths. Sixty-seven thousandths. Twenty-

three thousandths. Fifty-three thousandths. Eighty-one thousandths. Four thousandths. Seven thousandths. Six thousandths. Five thousandths.

5. Four thousand three hundred twenty-nine thousandths. Five thousand five ten-thousandths. Seven thousand three ten-thousandths. Two hundred eighteen ten-thousandths. Fifty-six ten-thousandths. One hundred one ten-thousandths. Eight ten-thousandths. Five ten-thousandths. Nine ten thousandths.

6. Write in figures one hundred ten and seventeen thousandths. This number is written

110.017.

In reading numbers, we never use the word *and* except when we have a whole number and a fraction as in the example above.

Write in figures five hundred and five thousandths. This number is written

500.005.

7. Express in figures: Five hundred and twenty-five hundredths. Four hundred and four hundredths. Six hundred twenty and twenty-three thousandths. One thousand and two thousandths. Two thousand and one hundred one thousandths. Four hundred and five thousandths. Six thousand one hundred five and five tenths. One hundred and one thousandth. Five hundred three and three hundredths. Seven hundred and ten thousandths.

ADDITION

Add:

23.154 To add decimals we first arrange
 19.3482 the numbers so that the decimal points
 5.5 stand in the same vertical column.
 5724.56 We then proceed as in the addition
 392.3209 of whole numbers, placing the decimal
 75.101 point of the sum in the same column
6239.9841 as the other decimal points.

EXERCISE 40 (Written)

Add:

Add:	(1)	(2)	(3)	(4)	
	24.75	16.74	19.81	18.34	
	17.39	19.29	27.32	39.87	
	93.54	16.01	17.09	92.08	
	83.58	75.73	94.92	86.38	
	27.23	54.94	89.23	87.39	
	<u>56.09</u>	<u>94.92</u>	<u>76.54</u>	<u>39.23</u>	
(5)	(6)	(7)	(8)	(9)	(10)
18.826	37.394	38.732	36.456	85.39	92.193
33.66	17.99	39.692	34.945	31.738	38.654
24.931	25.129	36.273	39.5	47.479	98.95
56.839	38.92	46.769	94.653	91.08	99.09
69.648	68.763	97.74	93.135	72.7	98.679
59.735	54.821	53.69	92.593	61.948	79.987

11. $13.25 + 19.38 + 57.11 + 11.49 + 94.49 + 52.76 + 66.76 = ?$

12. $23.45 + 29.23 + 34.98 + 39.49 + 28.35 + 27.26 + 22.83 = ?$

$$13. \quad 35.75 + 95.43 + 34.15 + 40.09 + 36.08 + 99.99 + 77.77 = ?$$

$$14. \quad 64.35 + 69.84 + 31.29 + 36.73 + 25.18 + 31.52 + 69.98 = ?$$

$$15. \quad 47.35 + 53.74 + 91.14 + 79.87 + 76.79 + 35.09 + 18.5 = ?$$

$$16. \quad 64.14 + 36.95 + 83.92 + 92.28 + 82.765 + 89.351 + 19.737 = ?$$

$$17. \quad 5.37 + 9.89 + 11.96 + 61.31 + 78.793 + 75.475 + 76.848 = ?$$

$$18. \quad 7.946 + 11.963 + 17.05 + 91.738 + 97.275 + 3.948 + 71.976 = ?$$

SUBTRACTION

From 72.01 take 1.623.

72.01

1.623

70.387

To subtract decimals, we first arrange the numbers so that the decimal points stand in the same vertical column. We then proceed as in subtraction of whole numbers, placing the decimal point of the answer under the other decimal points.

EXERCISE 41 (Written)

(1)	(2)	(3)	(4)	(5)	(6)
56.32	84.17	19.54	91.08	93.25	94.41
<u>21.73</u>	<u>24.69</u>	<u>5.58</u>	<u>11.59</u>	<u>24.39</u>	<u>25.86</u>
(7)	(8)	(9)	(10)	(11)	(12)
85.15	71.1	96.53	29.73	18.5	9.284
74.19	11.01	91.537	9.684	12.49	5.296

(13)	(14)	(15)	(16)	(17)	(18)
8.63	74.52	68.01	12.	90.001	96.002
<u>7.391</u>	<u>11.835</u>	<u>9.023</u>	<u>4.768</u>	<u>7.09</u>	<u>18.95</u>
(19)	(20)	(21)	(22)	(23)	(24)
38.89	100.	27.01	153.74	9.463	11.196
<u>19.038</u>	<u>76.74</u>	<u>17.011</u>	<u>96.792</u>	<u>4.979</u>	<u>5.697</u>
(25)	(26)	(27)	(28)	(29)	(30)
4.823	9.365	8.493	9.475	7.005	43.236
<u>2.95</u>	<u>4.44</u>	<u>5.595</u>	<u>2.387</u>	<u>3.928</u>	<u>34.647</u>

MULTIPLICATION

Multiply 5.393 by 8.

To multiply a decimal by a whole number, multiply as if the multiplicand were a whole number, and point off as many decimal places as there are decimal places in the multiplicand.

EXERCISE 42 (Written)

Multiply:

1. 7.23 by 4; by 6; by 7; by 8.
2. 9.462 by 3; by 5; by 7; by 9.
3. 8.305 by 7; by 8; by 9.
4. 9.025 by 6; by 9; by 12.
5. .125 by 6; by 8; by 14.
6. .0375 by 8; by 12; by 16.
7. .3125 by 4; by 8; by 9.

8. .0975 by 8 ; by 9 ; by 7.

9. .5436 by 9 ; by 10 ; by 8.

10. 3.25 by 100 ; by 7 ; by 6.

Multiply 3.6 by 2.6.

$$\begin{array}{r} 3.6 \\ \times 2.6 \\ \hline 21.6 \\ 72 \\ \hline 9.36 \end{array}$$

$$3.6 = 3\frac{6}{10} = \frac{36}{10}.$$

$$2.6 = 2\frac{6}{10} = \frac{26}{10}.$$

$$\text{Therefore, } 3.6 \times 2.6 = 3\frac{6}{10} \times 2\frac{6}{10} = \frac{36}{10} \times \frac{26}{10}$$

$$\frac{26}{10} = \frac{936}{100} = 9\frac{36}{100}, \text{ or } 9.36.$$

If there are decimal points in both multiplier and multiplicand, multiply the numbers as if both were whole numbers, then commencing at the right of the product, point off as many decimal places as there are decimal places in the multiplier and multiplicand combined.

EXERCISE 43 (Written)

- | | |
|---------------------------|----------------------------|
| 1. $1.3 \times 1.4 = ?$ | 12. $9.84 \times .18 = ?$ |
| 2. $1.6 \times 1.5 = ?$ | 13. $8.73 \times .24 = ?$ |
| 3. $1.7 \times 1.2 = ?$ | 14. $7.27 \times .28 = ?$ |
| 4. $1.8 \times 1.9 = ?$ | 15. $6.14 \times 1.1 = ?$ |
| 5. $2.4 \times 1.7 = ?$ | 16. $8.24 \times 3.2 = ?$ |
| 6. $2.5 \times 3.9 = ?$ | 17. $8.76 \times 2.1 = ?$ |
| 7. $12.5 \times 9.4 = ?$ | 18. $9.35 \times 4.8 = ?$ |
| 8. $23.8 \times 4.8 = ?$ | 19. $11.01 \times 5.6 = ?$ |
| 9. $27.2 \times 4.2 = ?$ | 20. $12.12 \times 6.4 = ?$ |
| 10. $2.68 \times 4.5 = ?$ | 21. $27.14 \times 7.2 = ?$ |
| 11. $3.54 \times 3.5 = ?$ | 22. $18.2 \times .75 = ?$ |

Multiply 2.39 by 10.

Multiplying in the usual manner, we get
 2.39 23.90, or 23.9, since $.9 = .90$.

10 Noticing the multiplier and the multipli-
23.90 cand, we see that this can be accomplished
 by moving the decimal point in the multi-
 plicand one place to the right.

Multiply 5.895 by 100.

5.895 To multiply a number by 100, move
 100 the decimal point in the multiplicand two
589.500 places to the right.

Multiply 7.854 by 1,000.

7.854 To multiply a number by 1,000. move
 1,000 the decimal point in the multiplicand
7,854.000 three places to the right.

EXERCISE 44 (Oral and Written)

1. Multiply by 10: 5.4; 7.82; 9.013; 8.64; 86.
2. Multiply by 100: 15.84; 19,952; 18.678; 4.4.
3. Multiply by 1,000: 15.635; .001; .053; .047.

DIVISION

Divide 571.424 by 7.

7)571.424 To divide a decimal number by a
 81.632 whole number of one figure, divide
 as with whole numbers and place the decimal point of
 the quotient under the decimal point of the dividend.

We divide a number by 1,000 by moving the decimal point of the number three places to the left. Thus, we divide 7.82 by 1,000 by moving the decimal point three places to the left. The quotient is .00782.

EXERCISE 45 (Oral and Written)

Divide by 10:

1. 27; 345; 7,290; 11.1824; 9.73; 12.01; .25; .39; .89; .007.

Divide by 100:

2. 793; 8,240; 9,974; 728.3; 29.7; 26.4; 5.27; 6.21; 7.302; .914.

Divide by 1,000:

3. 7,411; 8,213; 998; 712; 604; 68.2; 55.9; 1.73; 5.21; 4.32; 6.183; 5.213; .941; .75; .87; .92; .091; .056; .08; .072.

EXERCISE 46 (Written)

- | | |
|-------------------------|-------------------------|
| 1. $17.64 \div 3 = ?$ | 10. $29.621 \div 7 = ?$ |
| 2. $19.62 \div 4 = ?$ | 11. $15.491 \div 8 = ?$ |
| 3. $25.18 \div 4 = ?$ | 12. $.593 \div 8 = ?$ |
| 4. $93.01 \div 3 = ?$ | 13. $5 \div 8 = ?$ |
| 5. $74.73 \div 4 = ?$ | 14. $7 \div 8 = ?$ |
| 6. $9.732 \div 4 = ?$ | 15. $8 \div 9 = ?$ |
| 7. $8.725 \div 5 = ?$ | 16. $63.278 \div 5 = ?$ |
| 8. $11.91 \div 4 = ?$ | 17. $28.563 \div 6 = ?$ |
| 9. $13.684 \div 7 = ?$ | 18. $76.54 \div 3 = ?$ |
| 19. $98.196 \div 7 = ?$ | |

Multiply .0065 by 100.

We do this by moving the decimal point two places to the right. The product is .65.

Divide .65 by 100.

Obviously, the quotient is .0065.

.0065 is obtained from .65 by moving the decimal point in .65 two places to the left.

Hence, we divide a number by 100 by moving the decimal point of the number two places to the left.

Moving the decimal point two places to the right multiplies the number by 100. **Multiplying the dividend and the divisor by the same number does not alter the quotient.**

To divide a decimal by a decimal.

Divide .0796 by .36.

.22

36)7.96

72

72

72

First, we make a whole number out of the divisor by moving the decimal point two places to the right. Next, make a corresponding change in the dividend. Then we divide as by a whole number, first placing the decimal point of the quotient above the decimal point of the dividend.

EXERCISE 47 (Written)

Divide:

1. .2401 by .07.

4. .9604 by 1.4.

2. .4096 by .08.

5. .9216 by 1.6.

3. .5184 by .09.

6. .9025 by 1.9.

7.	2.8224 by 2.4.	19.	1.35424 by .92.
8.	1.1664 by .18.	20.	1.19025 by .69.
9.	1.6384 by .32.	21.	19.7136 by .74.
10.	3.5721 by .63.	22.	1.78929 by .47.
11.	1.50544 by .97.	23.	.213444 by .77.
12.	1.37641 by .53.	24.	.186624 by .48.
13.	11.6964 by 5.7.	25.	.126736 by .89.
14.	.0792 by .01.	26.	57.1536 by 1.08.
15.	1.23 by .05.	27.	15.4 by 12.5.
16.	1.3 by .08.	28.	18.3 by 1.6.
17.	2.1 by .03.	29.	17.9 by .18.
18.	17.2225 by .83.	30.	1.43 by .33.

MEASUREMENTS

The measures for areas are squares, as the square inch, the square foot, the square yard, the acre, and the square mile.

The **square inch** is the amount of surface in a square whose side is one inch.

The **square foot** is the amount of surface in a square whose side is one foot.

The **square yard** is the amount of surface in a square whose side is one yard.

The **acre** contains 4,840 sq. yd.

The **square mile** is the amount of surface in a square whose side is one mile. It contains 640 A.

EXERCISE 48 (Oral)

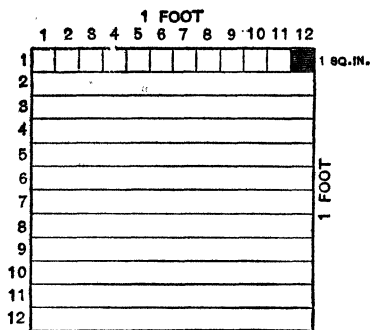


FIG. 1.

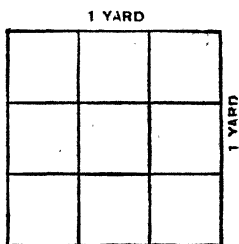


FIG. 2.

1. From Figure 1, find how many square inches in 1 sq. ft.
2. Each side of the large square in Figure 2 represents 1 yd. Each small square represents 1 sq. ft. How many square feet in 1 sq. yd.?
3. How many square inches in 2 sq. ft.? In 3 sq. ft.?
4. How many square feet in 2 sq. yd.? In 4 sq. yd.? In 8 sq. yd.? In 11 sq. yd.?
5. How many square inches in $\frac{1}{4}$ sq. ft.? In $\frac{1}{2}$ sq. ft.? In $\frac{3}{4}$ sq. ft.?
6. How many square feet in $\frac{1}{3}$ sq. yd.? In $\frac{1}{2}$ sq. yd.?
7. How many square yards in 18 sq. ft.? In 21 sq. ft.? In 24 sq. ft.?

EXERCISE 49 (Oral)

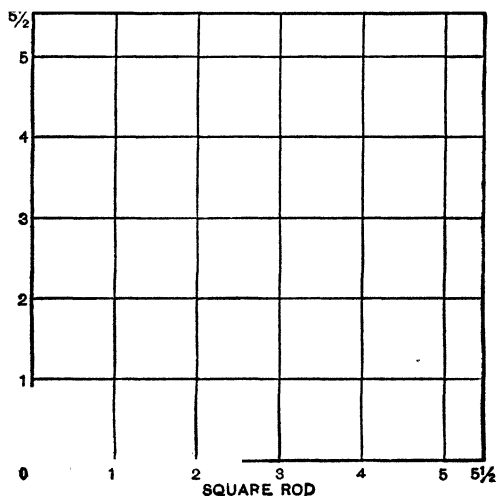
1. How many square yards in a rectangle 1 yd. long and $\frac{1}{2}$ yd. wide?

2. How many square yards in a square, each side of which is $\frac{1}{2}$ yd.?

3. How many square yards in a rectangle 5 yd. long and $\frac{1}{2}$ yd. wide?

4. How many square yards in a square, each of whose sides is 5 yd.?

5. The area of a square $5\frac{1}{2}$ yd. on a side is called a square rod. How many square yards make 1 sq. rd.?



LINEAR MEASURE

12 inches (in.) = 1 foot (ft.)

3 feet = 1 yard (yd.)

$5\frac{1}{2}$ yards = 1 rod (rd.)

320 rods = 1 mile (mi)

EXERCISE 50 (Oral and Written)

1. How many yards in 1 rd.? How many yards in 2 rd.?

2. How many yards in 3 rd.? In 4 rd.? In 5 rd.? In $5\frac{1}{2}$ rd.?

3. How many yards in 15 rd.? In 90 rd.? In 320 rd.?

4. How many yards in 1 mi.? In 2 mi.? In 3 mi.? In 5 mi.?

5. How many yards in 9 mi.? In 12 mi.? In 15 mi.? In 20 mi.?

6. How many feet in 1 rd.? In 2 rd.? In 7 rd.? In 9 rd.? In 11 rd.?

7. How many feet in 15 rd.? In 20 rd.? In 30 rd.? In 320 rd.?

8. How many feet in 1 mi.? In 2 mi.? In 5 mi.? In 12 mi.?

9. How many yards in 111 ft.? How many yards in 5,280 ft.?

10. How many rods in 11 yd.? How many rods in 55 yd.?
11. How many rods in $71\frac{1}{2}$ yd.? In $137\frac{1}{2}$ yd.?
12. How many miles in 640 rd.? How many miles in 1,600 rd.?
13. How many miles in 2,560 rd.?

SQUARE MEASURE

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (A.)
640 acres	= 1 square mile (sq. mi.)

EXERCISE 51 (Oral and Written)

1. How many square yards in 1 sq. rd.? In 2 sq. rd.? In 3 sq. rd.?
2. How many square yards in 4 sq. rd.? In 7 sq. rd.? In 11 sq. rd.? In 15 sq. rd.? In 20 sq. rd.? In 60 sq. rd.? In 100 sq. rd.? In 160 sq. rd.?
3. How many square yards in 1 A.? In 3 A.? In 5 A.? In 7 A.? In 9 A.?
4. How many square rods in 5 A.? In 7 A.? In 9 A.? In 15 A.? In 25 A.? In 32 A.? In 57 A.? In 100 A.? In 400 A.? In 640 A.?
5. A farm contains 96,000 sq. rd. How many acres in the farm?
6. A field contains 5,440 sq. rd. How many acres in the field?

7. How many acres in a rectangular lot 50 rd. long and 40 rd. wide?

8. How many acres in a farm 320 rd. long and 320 rd. wide?

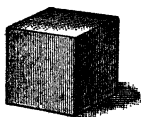
9. How many sq. rd. in $\frac{3}{4}$ of an acre? In $\frac{7}{8}$ of an acre? In $\frac{21}{32}$ A.? In .9 A.? In .7 A.? In .375 A.?

10. How many acres in .3125 sq. mi.? In .5625 sq. mi.?

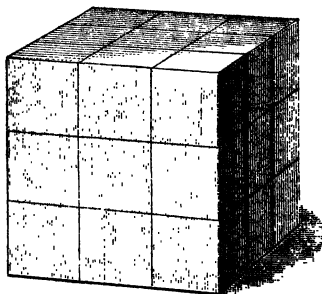
11. How many sq. yd. in .75 A.? In .625 A.? In .875 A.?

12. How many sq. in. in .0625 sq. ft.? In .1875 sq. ft.?

CUBIC MEASURE



CUBIC FOOT.



CUBIC YARD.

1,728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)
128 cubic feet	= 1 cord of wood.

A figure having **length**, **breadth**, and **thickness** is called a **solid**. By measuring a solid we find its **solid contents**, or **volume**.

The **volume** of a solid means the amount of space in it. Volume is measured by the cubic inch, cubic foot, or cubic yard.

A **rectangular solid** is a solid with square corners.

A brick is a rectangular solid.

A rectangular solid having its length, breadth, and thickness equal, is called a **cube**.

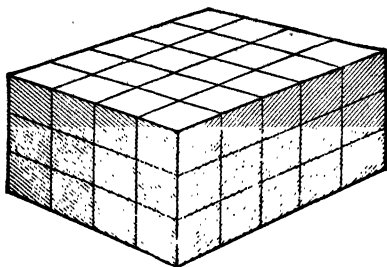
A cube with edges one inch long is called a **cubic inch**.

To find the volume of a rectangular solid, **multiply its length by its breadth by its thickness**.

EXERCISE 52 (Oral and Written)

1. How many cubic feet in $\frac{2}{3}$ of a cubic yard?
2. How many cubic feet and cubic inches in $\frac{1}{2}$ of a cubic yard?
3. How many cubic feet in a box 3 ft. long, 2 ft. wide, and 1 ft. deep?
4. A gallon contains 231 cu. in. How many gallons will it take to fill a cubical box each of whose sides is 1 ft.?
5. A bushel measure contains 2,150.42 cu. in. How many cubic feet in a bushel?
6. Thirty-two quarts make a bushel. How many cubic inches in one of these quarts?
7. Four quarts make a gallon. How many cubic inches in one of these quarts?

NOTE TO TEACHER. This subject should be developed by the use of objects.



8. How many cubic yards in a room 5 yd. long, 4 yd. wide, and 3 yd. high?

9. How many cubic feet in the same room? Give a rule for finding the number of cubic units in a rectangular solid.

10. A box is 17 in. by 12 in., and 9 in. deep. How many cubic inches in the box?

11. A pool of water is 25 ft. long, 18 ft. wide, and 4 ft. deep. How many cubic feet of water in the pool?

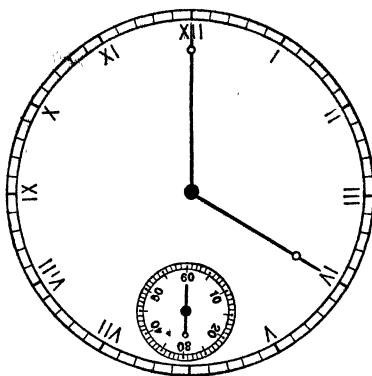
12. A wagon body is 7 ft. long, 4 ft. wide, and 3 ft. deep. How many cubic feet does it contain?

13. How many cubic feet of sand will it take to fill a lot 120 ft. by 40 ft. to a depth of 2 ft.?

14. How many cubic yards of sand are needed to fill a lot 108 ft. by 39 ft. to the depth of $1\frac{1}{2}$ ft.?

15. Find the cost of filling the above lot at 60 ¢ per cubic yard.

TIME MEASURE



60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
4 weeks	= 1 luna month
30 days	= 1 commercial month
12 months (mo.)	= 1 year (yr.)
365 days	= 1 common year
366 days	= 1 leap year

The names of the months and the number of days in each are as follows :

January	.	.	31 days	July	.	.	31 days
February	.	.	28 days	August	.	.	31 days
March	.	.	31 days	September	.	.	30 days
April	.	.	30 days	October	.	.	31 days
May	.	.	31 days	November	.	.	30 days
June	.	.	30 days	December	.	.	31 days

February has 29 days every leap year.

Omitting centennial years, if the number denoting the year is exactly divisible by 4, that year is a leap year.

Centennial years exactly divisible by 400 are leap years. Centennial years are years exactly divisible by 100.

EXERCISE 53 (Written)

1. How many days in the first three months of the present year?
2. How many days in the last three months of the present year?
3. How many days are there from the first of March to the fifth of May?
4. How many days from the first of February to the first of April in the year 1896?
5. How many minutes in 1 hr? In 10 hr? In 1 da.? In 2 da.? In 5 da.?
6. How many minutes in the month of January? In the month of July?
7. How many minutes in the month of September? Of December?
8. The school day begins at 9 A.M. and ends at 3 P.M. How many minutes in a school day? If the school day ends at 2.30 o'clock, how many minutes in the school day?

9. How many minutes in $1\frac{1}{2}$ hr.? How many minutes in $3\frac{3}{4}$ hr.?

10. How many hours and minutes in 200 min.? In 330 min.? In 500 min.? In 1,000 min.? In 10,000 min.?

11. How many minutes in 1 common year?

12. How many hours in a leap year?

13. How many hours in a commercial month?

14. How many hours are there from Christmas Day to the first of March?

15. How many hours are there from 9 A.M. Sunday to 4 P.M. Tuesday following?

16. How many weeks in one year? How many weeks in 4 consecutive years?

17. A man lived 76 yr. How many months did he live?

18. How many months in $58\frac{1}{2}$ yr.? In $5\frac{3}{4}$ yr.?

19. How many years and months in 400 mo.? In 905 mo.?

20. How many days in $\frac{1}{2}$ of a common year? In $\frac{1}{4}$ of a common year?

21. The average length of a year is $365\frac{1}{4}$ da. nearly. How many hours in a year? In $\frac{1}{4}$ of a year? In $\frac{3}{8}$ of a year?

22. How many hours are there from midnight October 31 to midnight January 31 following?

AVOIRDUPOIS WEIGHT

16 ounces (oz.) = 1 pound (lb.)

100 pounds = 1 hundredweight (cwt.)

2,000 pounds = 1 ton (T.)

EXERCISE 54 (Oral and Written)

1. How many ounces in 2 lb.? In 5 lb.?
2. How many pounds in 108 oz.? In 256 oz.?
3. How many ounces in $\frac{1}{2}$ lb.? In $\frac{3}{4}$ lb.? In $\frac{7}{8}$ lb.? In $\frac{7}{10}$ lb.?
4. How many ounces in .375 lb.? In 1.35 lb.? In 1.65 lb.?
5. What part of a pound is 9 oz.? What part of a pound is 10 oz.?
6. What part of a pound is 12 oz.? $2\frac{2}{3}$ oz.? $3\frac{1}{5}$ oz.? $9\frac{3}{5}$ oz.?
7. How many pounds in $\frac{1}{2}$ cwt.? In $\frac{3}{4}$ cwt.? In $\frac{7}{8}$ cwt.?
8. What part of a ton is 1 cwt.? 5 cwt.? 7 cwt.? 9 cwt.? 12 cwt.?
9. What decimal of a ton is 6 cwt.? 8 cwt.? 14 cwt.? 16 cwt.?
10. Find the price of $1\frac{1}{2}$ T. of coal at \$6.50 a ton.
1. A bushel of wheat weighs 60 lb. How many bushels of wheat will weigh 1 T.? 3 T.? $4\frac{1}{2}$ T.? 4.2 T.? 6.3 T.? $7\frac{1}{2}$ T.?
12. A bushel of oats weighs 32 lb. How many bushels of oats will weigh 1 T.? 3 T.? 14 T.? 24 T.? 32 T.? 48 T.?

13. Find the price of $5\frac{1}{2}$ T. of hay at \$10.50 a ton.
14. Find the price of a bale of hay weighing 100 lb. when hay sells for \$12 a ton.
15. Find the cost of 3 cwt. of coal at \$7.50 a ton.
16. Find the cost of a 25-lb. sack of flour at \$3.20 a hundredweight.

UNITED STATES MONEY

10 mills (m.)	= 1 cent (¢)
10 cents	= 1 dime
10 dimes	= 1 dollar (\$)
10 dollars	= 1 eagle

Write:

Two dollars, fifty cents, and five mills.

Six dollars, twenty-eight cents, and four mills.

Nine dollars, three cents, and five mills.

Ten dollars, ten cents, and two mills.

Read:

\$5.234; \$6.901; \$15.012; \$87.112; \$96.003.

How many mills are in \$1? in \$2? in \$3? in \$5? in \$5.42? in \$18.08?

How do you change dollars to mills?

How do you change mills to dollars?

What part of a dollar is a mill?

What name is given to the money shown by a figure written in the third place after the decimal point?

What is the meaning of the word mill?

EXERCISE 55

1. If the tax rate is 2¢ on the dollar, how much will a man pay on property valued at \$ 5,280? \$ 3,750? \$ 6,850?

2. The tax rate is $2\frac{1}{2}\text{¢}$ on the dollar. How much tax should a man pay on property valued at \$ 5,760? \$ 6,840? \$ 8,480?

3. The school tax in a certain city is 4 m. on the dollar. How much school tax does a man pay whose property is valued at \$ 6,000? \$ 7,250? \$ 8,925?

4. Find the tax paid on property valued at \$ 7,200, if the tax rate is 20 m. on the dollar.

5. The tax rate in a certain city is $3\frac{1}{3}\text{¢}$ on the dollar. How much tax will a man pay on property valued at \$ 8,400? \$ 3,360? \$ 2,490?

6. A bale of cotton which weighs 480 lb. is sold at $9\frac{1}{2}\text{¢}$ per pound. How much does the bale sell for?

7. A man plants 20 A. in cotton. The yield is $\frac{3}{4}$ of a bale per acre. How much is the crop worth at $9\frac{1}{4}\text{¢}$ per pound, the average weight of a bale being 510 lb.?

8. A farmer plants 30 A. in wheat, which yields 18 bu. per acre. How much is the crop worth at $76\frac{1}{4}\text{¢}$ per bushel?

9. A 20-A field yields 35 bu. of oats per acre. What is the crop worth at $37\frac{3}{8}\text{¢}$ per bushel?

COMPOUND QUANTITIES

Quantities expressed in terms of different measures from the same table are called **compound quantities**. For example, 5 yd., 2 ft., 7 in. is a compound quantity. 2 hr., 25 min. is a compound quantity.

ADDITION OF COMPOUND QUANTITIES

1. Find the sum of 5 yd., 2 ft., 3 in.; 6 yd., 1 ft., 3 in.; 2 yd., 2 ft., 11 in.

YD.	FT.	IN.	
5	2	3	Adding the column of inches, we have $(11 + 3 + 3)$ in. = 17 in. = 1 ft., 5 in. Write 5 in. and carry 1. $(1 + 2 + 1 + 2)$ ft. = 6 ft. = 2 yd. Write 0 in the column for feet and carry 2.
6	1	3	
2	2	11	
15	0	5	

$(2 + 2 + 6 + 5)$ yd. = 15 yd. Write 15 yd.

EXERCISE 56

1. Add:

FT.	IN.
7	4
9	8
6	11

2. Add:

FT.	IN.
5	5
7	7
11	10

3. Add:

FT.	IN.
6	2
9	9
5	8

4. Add:

HR.	MIN.
2	17
7	18
9	55

5. Add:

HR.	MIN.
9	28
8	43
6	24

6. Add:

HR.	MIN.
15	12
19	39
14	48

7. Add :		8. Add :		9. Add :	
LB.	OZ.	LB	OZ.	LB.	OZ
9	11	6	13	23	5
7	9	5	12	29	6
8	15	2	14	37	11

10. Add :			11. Add :		
GAL.	QT.	PT.	GAL.	QT	PT
5	3	1	11	2	1
6	2	1	8	3	1
9	1	0	7	3	1

12. Add :			13. Add :		
BU.	PK.	QT.	BU	PK.	QT.
5	3	5	8	2	6
2	2	4	7	3	7
9	1	7	3	2	5

14. A cow averages 3 gal. 3 qt. and 1 pt. of milk a day during the month of January. At 4¢ a pint, what is the total value of the milk the cow gives in one day? What is the total value of the milk the cow gives during the month of January?

15. A sack contains 2 bu 2 pk. and 5 qt. of pecans. What is the sack worth at 7¢ per quart?

16. How far will a freight train run in 2 hr. and 15 min. at 18 mi. an hour?

17. Find how far a passenger train will run in 5 hr. and 45 min. at the rate of 36 mi. per hour.

18. A yard of ribbon sells for 15¢; how much should be paid for a ribbon 5 yd. 2 ft. 3 in. long?

SUBTRACTION

EXERCISE 57

1. Subtract 19 bu., 3 pk., 4 qt. from 25 bu., 1 pk., 2 qt.

BU.	PK.	QT.
25	1	2
19	3	4
5	1	6

As 4 qt. cannot be taken from 1 qt., we take it from 1 pk. and 2 qt.

1 pk. and 2 qt. = 10 qt. 4 qt. from 10 qt. leaves 6 qt.

Write 6, carry 1.

1 pk. and 3 pk. are 4 pk. 4 pk. from 1 bu. and 1 pk. leaves 1 pk. Write 1 pk and carry 1. 1 bu. and 19 bu. are 20 bu. 20 bu. and 5 bu. are 25 bu. The answer is 5 bu., 1 pk., and 6 qt.

Subtract :

- 9 bu., 2 pk., 7 qt. from 20 bu., 3 pk., 5 qt.
- 15 bu., 3 pk., 5 qt. from 20 bu., 3 pk., 1 qt.
- 27 bu., 1 pk., 4 qt. from 33 bu., 0 pk., 2 qt.
- 4 gal., 2 qt., 1 pt. from 10 gal.
- 7 gal., 3 qt., 1 pt. from 15 gal., 1 qt.
- 5 yd., 1 ft., 7 in. from 11 yd., 1 ft., 2 in.
- 9 yd., 2 ft., 3 in. from 17 yd.
- 16 yd., 2 ft., 4 in. from 24 yd., 2 ft., 1 in.
- 12 da., 7 hr., 17 min. from 29 da., 2 hr., 28 min.
- 11 da., 3 hr., 30 min., from 17 da., 2 hr., 20 min.
- 37 lb., 11 oz. from 50 lb., 9 oz.
- 18 lb., 12 oz., from 28 lb., 10 oz.
- 34 lb., 4 oz. from 45 lb., 8 oz.

MULTIPLICATION

EXERCISE 58

1. If one side of a square is 17 ft., 5 in., find the length of its four sides.

Four times 5 in. are 20 in., which equals 1 ft., 8 in. Write 8 in. and carry 1 ft.

FT.	IN.
17	5
	4
69	8

4 times 17 ft. are 68 ft. 68 ft. and 1 ft are 69 ft.

The answer is 69 ft. 8 in.

Multiply:

2. 11 ft., 7 in. by 12; 15 ft., 3 in. by 6.
3. 13 ft., 5 in. by 7; 9 ft., 11 in. by 11.
4. 11 gal., 2 qt., 1 pt. by 6; 13 gal., 3 qt., 1 pt. by 8.
5. 9 gal., 1 qt., 1 pt. by 9; 3 gal., 3 qt., 1 pt. by 11.
6. 24 bu., 2 pk., 6 qt. by 5; 29 bu., 3 pk., 3 qt. by 6.
7. 27 bu., 1 pk., 7 qt. by 10; 18 bu., 3 pk., 2 qt. by 9.
8. 4 wk., 3 da., 15 hr. by 6; 7 wk., 6 da., 18 hr. by 7.
9. 17 lb., 7 oz. by 7; 25 lb., 11 oz. by 12.
10. In the south half of a block there are 7 lots, each 42 ft., 10 in. wide. How long is the block?

DIVISION

EXERCISE 59

1. The total surface of a cube is 37 sq. ft., 72 sq. in. Find the area of one of its faces.

A cube has six faces. Hence the area of one face is $\frac{1}{6}$ of the total surface of the cube. $\frac{1}{6}$ of 37 sq. ft. is 6 sq. ft., with 1 sq. ft. left over. 1 sq. ft. and 72 sq. in. equals 216 sq. in. $\frac{1}{6}$ of 216 sq. in. equals 36 sq. in. The answer is 6 sq. ft., 36 sq. in.

Divide:

2. 10 gal., 2 qt., 1 pt. by 4; 33 bu., 3 pk. by 5.
3. 170 yd., 3 ft., 2 in. by 18; 9 yd., 2 ft., 8 in. by 4.
4. 25 hr., 15 min. by 15; 16 hr., 48 min. by 6.
5. 19 hr., 18 min. by 12; 18 lb., 12 oz. by 8.
6. 36 lb., 4 oz. by 10; 24 sq. ft., 96 sq. in. by 16.
7. How many boards each 12 ft. long will extend once around a lot 96 ft. by 30 ft.?
8. How many tiles 4 in. by 4 in. will pave a hall 18 ft. by 10 ft.?
9. How many square tiles 6 in. on a side will it take to pave a court 40 ft. by 25 ft.?
10. How many square inches are in a rectangle 4 ft., 6 in. long and 2 ft., 4 in. wide? How many square feet are in its area?

The **perimeter** of any figure means the distance around it.

PERCENTAGE

A farmer gives his son 1 sheep out of every 3 in a flock. If the flock consists of 1,200 sheep, how many sheep does the son get?

If the father gives him 1 sheep out of every 4 in the flock, how many does he get? If he gives him 1 sheep out of every 5 in the flock, how many does he get? If he gives him 1 sheep out of every 10 in the flock, how many does he get? If he gives him 1 sheep out of every 100 sheep in the flock, how many does he get? If he gives him 2 sheep out of every 100 in the flock, how many does he get? If he gives him 3 out of every 100, how many does he get? If he gives him 6 out of every 100, how many does he get?

1 in a hundred is commonly called 1 per cent.

2 in a hundred is commonly called 2 per cent.

3 in a hundred is commonly called 3 per cent.

6 in a hundred is commonly called 6 per cent.

1 per cent is often written 1 %.

2 per cent is often written 2 %.

3 per cent is often written 3 %.

4 per cent is often written 4 %.

5 per cent is often written 5 %.

6 per cent is often written 6 %.

EXERCISE 60 (Written)

1. Find 1 % of \$2,750.

$$1\% \text{ of } \$2,750 = \frac{\$2,750}{100} = \$27.50.$$

2. Find 3 % of \$ 2,750.

$$\frac{3}{100} \text{ of } \$ 2,750 = \frac{3 \times \$ 2750}{100} = 3 \times \$ 27.50 = \$ 82.50.$$

Find :

3. 2 % of \$ 1,250 ; 3 % of \$ 1,250 ; 4 % of \$ 1,250 ;
5 % of \$ 1,250 ; 6 % of \$ 1,250.

4. 3 % of \$ 1,800 ; 4 % of \$ 1,800 ; 5 % of
\$ 1,800 ; 6 % of \$ 1,800 ; 7 % of \$ 1,800.

5. 3 % of \$ 2,500 ; 4 % of \$ 2,500 ; 5 % of \$ 2,500 ;
6 % of \$ 2,500 ; 8 % of \$ 2,500.

6. 4 % of \$ 1,750 ; 5 % of \$ 1,750 ; 6 % of \$ 1,750 ;
7 % of \$ 1,750 ; 8 % of \$ 1,750.

7. 5 % of \$ 2,150 ; 6 % of \$ 2,150 ; 7 % of \$ 2,150 ;
8 % of \$ 2,150 ; 9 % of \$ 2,150.

8. 6 % of \$ 775 ; 7 % of \$ 775 ; 8 % of \$ 775 ; 9 %
of \$ 775 ; 10 % of \$ 775.

9. 7 % of \$ 640 ; 8 % of \$ 640 ; 9 % of \$ 640 ;
10 % of \$ 640 ; 11 % of \$ 640.

10. 8 % of \$ 780 ; 9 % of \$ 780 ; 10 % of \$ 780 ;
11 % of \$ 780 ; 12 % of \$ 780.

11. A man invests \$ 2,400 in business and gains
20 % on his investment. Find his gain.

12. A farmer gives his eldest son 25 % of a farm
containing 648 A. How many acres does he give
his son ? What part of the farm does the son get ?

13. A man dying leaves 25 % of his estate to his widow, 15 % to each of his three sons, and the remainder to his daughter. The estate was valued at \$ 9,500. Find the share of the widow, of a son, and of the daughter.

14. A lawyer collects a debt amounting to \$ 550, and charges 6 % for collecting it. Find the lawyer's fee for collecting the debt.

15. A real estate agent sold 540 A. of land for \$ 25 an acre, and charged 4 % for selling it. How many dollars did he charge for selling the land ?

16. The population of a certain city is 29,500. 12 % of the population can neither read nor write. Find the number in that city who can neither read nor write.

INTEREST

Money paid for the use of money is called **interest**.

Interest is reckoned as a rate per cent *per annum*.

Per annum means "by the year."

EXERCISE 61 (Written)

Find the interest on :

- | | |
|-------------------------------|-----------------------------|
| 1. \$ 500 for 1 yr. at 5 %. | 5. \$ 230 for 1 yr. at 8 %. |
| 2. \$ 750 for 1 yr. at 4 %. | 6. \$ 560 for 1 yr. at 7 %. |
| 3. \$ 1,200 for 1 yr. at 6 %. | 7. \$ 385 for 1 yr. at 5 %. |
| 4. \$ 850 for 1 yr. at 7 %. | 8. \$ 445 for 1 yr. at 6 %. |

9. Find the interest on \$ 650 for 7 mo. at 5 %.

$$\frac{\$ 650}{100} \times 5 = \text{interest for 1 yr.}$$

$$\frac{\$ 650}{100} \times 5 \times \frac{7}{12} = \text{interest for 7 mo.}$$

$$\$ 6.50 \times 5 \times \frac{7}{12} = \$ 18.958, \text{ or } \$ 18.96 \text{ nearly.}$$

The sum of money on which interest is reckoned is called the **principal**.

The sum of the principal and the interest is called the **amount**.

Find the interest on :

1. \$ 240 for 3 mo. at 6 %.
2. \$ 500 for 3 mo. at 8 %.
3. \$ 672 for 4 mo. at 5 %.
4. \$ 945 for 4 mo. at 6 %.
5. \$ 387 for 5 mo. at 9 %.
6. \$ 250 for 7 mo. at 8 %.
7. Find the amount of \$ 750 for $1\frac{1}{2}$ yr. at 6 %.
8. Find the amount of \$ 800 for $1\frac{1}{4}$ yr. at 7 %.
9. Find the amount of \$ 690 for 1 yr. 4 mo. at 7 %.
10. Find the amount of \$ 840 for 7 mo. at 7 %.

GRADED WRITTEN TESTS

From the following exercises grade tests may be made by selecting all the exercises for the first test, all the *B* exercises for the second test, and so on. The exercises under one letter are all of the same grade. Each group of problems may be used as a single test.

On the pupil's test paper give directions for performing the operations modifying the directions given here if necessary.

Aim for accuracy first, then for accuracy and speed. Time each test; keep a record of the results.

There is no arbitrary rule for marking results. A fair decision seems to rest upon the following rule: Abstract exercises, 100 % if correct, 0 if incorrect; thought problems, 100 % if correct, 50 % for correct method, and 50 % for correct abstract work. Rules for marking should be made in advance and referred to the local superintendent of schools for approval.

EXERCISES (Part I)

1. Add rapidly and write the answers only :

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
365	56	\$ 24.63	\$ 579.06
79	4,326	9.52	.05
340	940	367.40	27.98
501	805	45.08	9,640.70
68	6,001	600.75	306.42
326	40	80.29	800.80
<u>700</u>	<u>709</u>	.01	77,305.00

2. Subtract and write the answer to the exercise on the test paper :

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
7,649	18,627	\$ 906.78	\$ 6078.14
<u>530</u>	<u>4,509</u>	<u>389.70</u>	<u>930.57</u>

3. Multiply :

A. 457 by 28.

C. 20,719 by 305.

B. 2,318 by 400.

D. 6,490.37 by 2,008.

4. Use the pencil only when necessary, and find the quotient :

A. The dividend is 7,351 ; the divisor 9.

B. The dividend is 6,857 ; the divisor 40.

C. The dividend is 8,673 ; the divisor 21.

D. The dividend is 96,502 ; the divisor 703.

5. Write in Roman numbers :

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
10	14	37	75
4	16	44	92
<u>12</u>	<u>20</u>	<u>50</u>	<u>100</u>

6. Write answers only :

<i>A</i>	<i>C</i>
$2 \times 4 \times 3 = ?$	$4 \times 5 \times 6 = ?$
$3 \times 5 \times 6 = ?$	$2 \times 11 \times 5 = ?$
$10 \times 7 \times 2 = ?$	$9 \times 5 \times 4 = ?$

B

$8 \times 9 \times 10 = ?$

$4 \times 1 \times 12 = ?$

$7 \times 5 \times 3 = ?$

D

$10 \times 10 \times 10 = ?$

$20 \times 4 \times 6 = ?$

$50 \times 8 \times 3 = ?$

7. Write two factors of

A. 6; 12; 18.*B.* 36; 60; 72.

Write three factors of

C. 64; 70; 84.*D.* 120; 144; 168.

8. Solve without pencil:

A. $\frac{1}{2}$ of 24; $\frac{1}{4}$ of 36.*C.* $\frac{3}{4}$ of 32; $\frac{4}{5}$ of 60.*B.* $\frac{1}{8}$ of 96; $\frac{1}{6}$ of 42.*D.* $\frac{5}{6}$ of 120; $\frac{2}{3}$ of 390.**EXERCISES (Part II)**

1. Using the numbers 518 and 4,327 find

A. difference*C.* product*B.* sum*D.* quotient

2. Find the sum:

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
24,650	40,000	\$ 36.95	8.79
856	529	8.02	95.64
9,587	2,480,721	575.00	.007
356,200	360,040	3,850.98	542.1
900,007	8,567	780.00	376.08
48,005	24,003	96,432.70	6,000.55
329,504	5,436,750	.44	395

3. Subtract and check :

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
4,630	95,400	605.9	\$ 9036.92
<u>998</u>	<u>7,285</u>	<u>523.68</u>	<u>70.24</u>

4. Find the product :

MULTIPLICAND	MULTIPLIER	MULTIPLICAND	MULTIPLIER
<i>A.</i> 957	86	26,017	800
<i>B.</i> 3,589	250	\$ 413.69	6,005

5. Find the quotient :

<i>A.</i> $9,486 \div 12$.	<i>C.</i> $\$ 168.42 \div 401$.
<i>B.</i> $4,905 \div 37$.	<i>D.</i> $8.236 \div .145$.

6. Find the sum :

<i>A.</i> $61\frac{1}{8}, 18\frac{3}{4}, 25$.	<i>C.</i> $241\frac{1}{4}, 182\frac{1}{12}, 3\frac{2}{3}, 60\frac{5}{6}$.
<i>B.</i> $13\frac{1}{2}, 44\frac{2}{3}, 70\frac{5}{6}$.	<i>D.</i> $37\frac{4}{5}, 8\frac{1}{2}, 94\frac{3}{10}$.

7. Subtract :

MINUEND	SUBTRAHEND	MINUEND	SUBTRAHEND
<i>A.</i> $475\frac{1}{2}$	$200\frac{3}{8}$	<i>C.</i> 5,407	$302\frac{5}{6}$
<i>B.</i> $863\frac{1}{2}$	$49\frac{2}{7}$	<i>D.</i> $16,325\frac{2}{3}$	$4,906\frac{3}{4}$

8. Find the answers :

<i>A.</i> $420 \times 29\frac{3}{7}$.	<i>C.</i> $\frac{7}{8} \times \frac{3}{4}$.
<i>B.</i> $3\frac{3}{4} \times 2\frac{1}{2} \times 4$.	<i>D.</i> $34\frac{3}{8} \times 5$.

9. Reduce :

- A.* 2,364 gallons to quarts.
- B.* 45 yards to inches.
- C.* 612 ounces to pounds and ounces.
- D.* 102 pints dry measure to bushels.

10. *A.* What part of a bushel is 8 pints?
- B.* What part of a long ton is 112 pounds?
- C.* What part of a day is 120 minutes?
- D.* What part of 3 yards is 10 inches?

PROBLEMS (Part I)

1. Helen has 9 Thrift Stamps on her card. How much money does she need to fill the card?
2. Katharine's War Savings card contains 18 Thrift Stamps. How much money did she pay for them?
3. If Tom saves 5 cents a day for 8 weeks, how many Thrift Stamps can he buy? How many cents will he have left over?
4. A dressmaker ordered 96 cards, each card containing a dozen buttons. How many buttons did she receive?
5. There are 945 pupils in a school. Three fifths of them are boys. How many boys are on register?
6. A garage keeper bought 146 gallons of gasoline. How many pints did he buy?
7. Harry has 2 quarters, 3 dimes, and 3 nickels. How many cents has he all together?
8. In an arithmetic there are 3,576 examples. Each page contains 24 examples. There are how many pages in the book?
9. A family uses 3 quarts of milk daily. What is the milk bill for the months of February, March, and April?

PROBLEMS (Part II)

1. The sum of two numbers is $46\frac{7}{8}$. One of the numbers is $9\frac{2}{3}$. What is the other?

2. The temperature at noon for one week was 83° , 88° , 90° , 86° , 81° , 76° , and 77° . What was the average temperature for the week?

3. A patriot had \$1,250 in the bank. He drew out $\frac{2}{5}$ of it for a Liberty Bond. What was the value of his bond?

4. The Red Cross Society in a certain city sent out an urgent call for new members. The answer was an average of 562 persons a day for two weeks. How many new members did the society gain?

5. The family telephone bill for the past month was \$3.34 for local calls, plus \$.15, \$.68, and \$2 for long-distance service. What was the total bill?

6. A sheet of paper used to cover a geography measures 10 inches by 25 inches. How many square inches of paper will be needed for 36 books?

7. Longfellow was born February 27, 1807; Lowell, February 22, 1819. What was the difference in their ages.

8. The people in a village having a population of 4200 bought through the local postoffice \$84,000 of War Savings Stamps in one year. What was the average purchase of stamps per person?

TABLES

LIQUID MEASURE

4 gills (gi.)	= 1 pint (pt.)
2 pints	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)
31½ gallons	= 1 barrel (bbl.)
2 barrels	= 1 hogshead (hhd.)

DRY MEASURE

2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

NUMERICAL

12 articles	= 1 dozen (doz.)
12 dozen	= 1 gross
12 gross	= 1 great gross
20 articles	= 1 score

LINEAR, OR LONG MEASURE

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
5½ yards	= 1 rod (rd.)
320 rods	= 1 mile (mi.)

PAPER MEASURE

24 sheets	= 1 quire
20 quires	= 1 ream
2 reams	= 1 bundle
5 bundles	= 1 bale

UNITED STATES MONEY

10 mills (m.)	= 1 cent (¢)
10 cents	= 1 dime
10 dimes	= 1 dollar (\$)
10 dollars	= 1 eagle

SQUARE MEASURE

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
30¼ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (A.)
640 acres	= 1 square mile (sq. mi.)

AVOIRDUPOIS WEIGHT

16 ounces (oz.)	= 1 pound (lb.)
100 pounds	= 1 hundredweight (cwt.)
20 hundredweight	= 1 ton (T.)
2,240 pounds	= 1 long ton

CUBIC MEASURE

1,728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)
128 cubic feet	= 1 cord of wood

TIME MEASURE

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
4 weeks	= 1 lunar month
30 days	= 1 commercial month
12 months (mo.)	= 1 year (yr.)
365 days	= 1 common year
366 days	= 1 leap year

ROMAN NOTATION

1 . .	I	10 . .	X	100 . .	C	1,000 . .	M
2 . .	II	20 . .	XX	200 . .	CC	2,000 . .	MM
3 . .	III	30 . .	XXX	300 . .	CCC	3,000 . .	MMM
4 . .	IV	40 . .	XL	400 . .	CD	4,000 . .	IV
5 . .	V	50 . .	L	500 . .	D	5,000 . .	V
6 . .	VI	60 . .	LX	600 . .	DC	6,000 . .	VI
7 . .	VII	70 . .	LXX	700 . .	DCC	7,000 . .	VII
8 . .	VIII	80 . .	LXXX	800 . .	DCCC	8,000 . .	VIII
9 . .	IX	90 . .	XC	900 . .	CM	9,000 . .	IX

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